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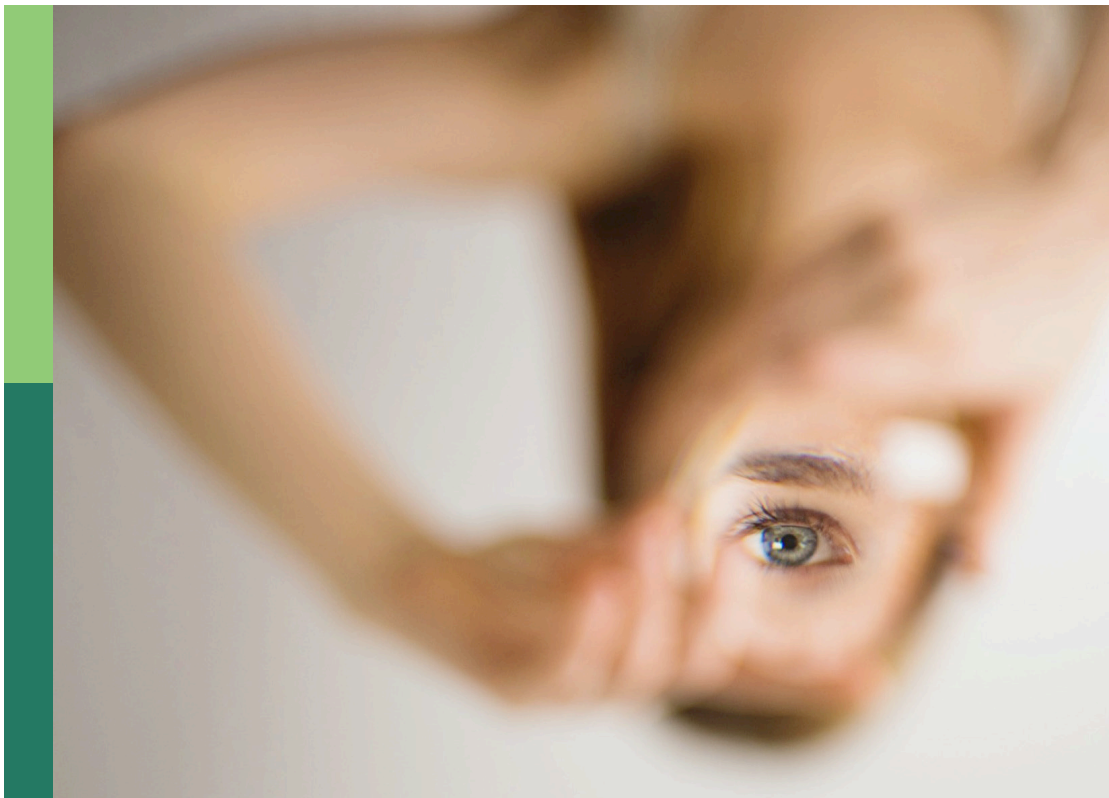

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Understanding socioemotional and academic adjustment during childhood and adolescence: Volume II

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Perfectionism Classes and Aggression in Adolescents

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Some of the components of perfectionism produce a variety of problems, such as interpersonal hypersensitivity and hostility, that may be associated with aggression behavior during adolescence. This study aims to identify classes of adolescents depending on their levels of Perfectionistic Strivings (PS) and Perfectionistic Concerns (PC) as well as to examine whether there are significant differences in the manifestations of the four components of aggression behavior (i.e., anger, hostility, physical aggression, and verbal aggression) between them. A total of 1,074 high school students from various educational centers participated in this study (M = 14.78, SD = 1.84). The Child-Adolescent Perfectionism Scale and the Aggression Questionnaire short form were used. The Latent Class Analysis identified three classes of adolescent perfectionism: (a) Non-Perfectionists (low PS and PC), (b) Maladaptive Perfectionists (high PS and PC), and (c) Adaptive Perfectionists (moderate PS and PC). Results revealed significant differences between classes regarding the different manifestations of aggression. Maladaptive Perfectionists and Adaptive Perfectionists reported, respectively, the highest and lowest levels of aggression behavior. This study assists in educational programs to prevent conflicts related to school violence through emotional adjustment.

Keywords: adolescents, perfectionistic strivings, perfectionistic concerns, latent class analysis, aggressive behavior

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INTRODUCTION

Perfectionism is a personality trait characterized by the imposition of extremely high-performance standards upon oneself that are unrealistic, along with the motivation to achieve perfection and the perception of one's environment as too demanding and critical (García-Fernández et al., 2016). According to Flett et al. (2000, unpublished), child and adolescent perfectionism is constituted by the dimensions of Socially Prescribed Perfectionism, defined as the belief that people in the environment demand that you be perfect, and Self-Oriented Perfectionism, understood as the motivation to achieve perfection in the achievement of tasks along with high performance expectations. Thus, perfectionism is a multidimensional personality trait (Hewitt et al., 2008) with both, intrapersonal and interpersonal components.

The two-factor theory of perfectionism argues that it is possible to classify any perfectionist dimension into two higher-order dimensions: one is considered adaptive and it is called Perfectionistic Strivings (PS), while the other is considered maladaptive and is commonly

called Perfectionistic Concerns (PC; Stoeber, 2018). PS involves rigid and unrealistic demand for self-perfection. There is a debate about the adaptive or maladaptive nature of PS. Some researchers point out that PS are positively related to psychopathology, especially as a risk factor for eating disorders (Bardone-Cone et al., 2007) or after a performance failure (Besser et al., 2004) or to hostility (Vicent et al., 2017). Although this debate continues, it is generally accepted that PS tend to be less related to negative outcomes than PC.

On the other hand, PC are a latent construct that includes the self-critical aspects of perfectionism, such as perception of the demand for perfection by others, doubts about personal competence, self-punishment for failure, and self-deception about personal performance. This latent construct represents a set of diverse constructs that include interpersonal personality (Hewitt and Flett, 1991), cognitive behavioral (Frost et al., 1990), psychodynamics (Blatt et al., 1976), and psychology of counseling (Slaney et al., 2001). PC constitutes a risk factor for mental health, such as depression, anxiety, eating disorders, autolysis, and personality disorders (Hewitt and Flett, 1991), as well as for physical health such as sleep disorders or sexual dysfunction (Stoeber et al., 2013). Also, people high in PC tend to experience many interpersonal problems (Habke and Flynn, 2002) such as loneliness, interpersonal conflicts, hostility, problems with perceived social support, divorce, etc. (Hewitt et al., 2008). Thus, most authors point out PC as a maladaptive construct (Sherry et al., 2016).

Thus, taking into account the diversity of scales and subscales of perfectionism that exists; this two-factor model allows compare previous research as different subscales can be employed as indicators of PS and PC. In this sense, Socially Prescribed Perfectionism, for example, is considered an indicator of PC, whereas Self-Oriented Perfectionism is employed as a measure of PS. Other authors, however, have used other dimensions as indicators of PS and PC (Frost et al., 1990).

Perfectionism Profiles

Several authors have used different scales and subscales for identifying perfectionism profiles. However, in order to interpret the results of these studies under a common framework, the terms PS and PC will be used. Although different profile solutions have been found by previous research analyzing perfectionism profiles, most of studies using the methods of Latent Profile Analysis or Latent Class Analysis found a three-class solution. For example, Gilman et al. (2014) found three profiles of perfectionism in a study among 718 high school students from the United States: adaptive perfectionists (high PS and low PC) which represented a 61.8% of the sample, maladaptive perfectionists (high PS and PC) representing the 15.7% of the sample, and non-perfectionists (low PS and PC) classifying the 22.25% of the sample. Moate et al. (2016) also found a three-profile solution: adaptive perfectionists (high PS and low PC), maladaptive perfectionists (high PS and PC), and non-perfectionists (low PS and PC), who represented 58.1, 28.8, and 13.1%, respectively, in a sample of 528 doctoral students from the United States. In another study among 186 Russian undergraduate students, Wang et al. (2016) found the same profiles than Moate et al. (2016) with a prevalence of 39, 34 and 27%, respectively. Similarly, Vicent et al. (2019b), in a sample of 431 Spanish primary school students, found three profiles of perfectionism: high perfectionism (high PS and PC), moderate perfectionism (moderate PS and PC), and non-perfectionism (low PS and PC) representing, respectively, the 26.68, 62.41 and 10.90% of the sample.

Perfectionism Profiles and Aggression Behavior

The first and unique study by Vicent et al. (2017) has analyzed the relationship between perfectionism and the four components of aggression behavior from a person-oriented approach. Thus, in a sample of 1,815 Spanish students between 8 and 11 years, four profiles of child perfectionism through a cluster analysis were identified: Non-Perfectionism (low PS and PC), Pure PC (low PS and high PC), Pure PS (moderate PS and low PC), and Mixed Perfectionism (high PS and PC). In terms of aggression, Mixed Perfectionism was the most maladaptive profile reporting the highest scores on the four factors of aggression behavior as well as on the total score. In contrast, Non-Perfectionism and Pure PS were more adaptive than the others were as they reported the lowest scores on aggression behavior. However, although results of Vicent et al. (2017) provided evidence about the relationship between child perfectionism profiles and aggression behavior, the study has several limitations. First, results of this study cannot be generalized to other samples such as adolescents or adults. Since, according to the review prepared by Sánchez de la Flor (2018), aggressive behavior changes with age. Aggression in the first years of life is instrumental and evolves in a stable way until 5–6 years when the child shows a more reactive type of aggression (hostile and verbal). Preadolescence is key in the development of aggressiveness, being the age most vulnerable to the development of this type of behavior, decreasing these as the subject grows. Secondly, the method employed, specifically a non-hierarchical cluster analysis presents several limitations, which has been overcome by other techniques such as Latent Class Analysis (LCA). In fact, LCA is considered nowadays a more appropriate method for researching about profiles (Schreiber, 2017).

This Study

This study tries to overcome the limitations of Vicent et al. (2017) work mentioned above by analyzing the relationship between perfectionism and the four components of aggression behavior from a person-oriented approach in a sample of Spanish adolescents. Specifically, it is aimed (a) to identify profiles of different combinations of the perfectionist dimensions, PS and PC, in adolescents by using LCA and (b) to analyze the inter-class differences on the four components of aggression behavior (anger, hostility, physical aggression, and verbal aggression). Regarding the first aim, it is expected to find a similar perfectionism three-class solution in our sample of Spanish adolescents (i.e., high perfectionism, moderate perfectionism, and non-perfectionism) than that previously

obtained by Vicent et al. (2019a) in a sample of Spanish children. Secondly, it is expected that those profiles defined by high levels of both perfectionism dimensions reported the highest mean scores on anger, hostility, physical aggression, and verbal aggression (Vicent et al., 2017).

MATERIALS AND METHODS

Participants

A total of 1,074 high school students with an average socioeconomic level from various educational centers in the Region of Murcia participated in this study. The ages ranged from 12 to 18 years (M = 14.78, SD = 1.84). Selection of participants was random through a multi-stage cluster sampling, and clusters were geographical (urban, semi-urban, and rural), high schools (public and private), and classroom (randomly selected from compulsory education).

An initial sample of 1,724 participants was obtained. However, 650 students were excluded because questionnaires had missing data or errors, or because they were immigrant with low language domain, or because they did not assist to school when questionnaires were administered.

In the final sample, 60.1% were women, and 39.9% were men.

Instruments

The Child-Adolescent Perfectionism Scale (CAPS) of Flett et al. (2016) was used, which is a 22-item instrument based on the multidimensional conceptualization of perfectionism (Hewitt and Flett, 2004). This instrument measures two subscales: Self-Oriented Perfectionism (e.g., "I get angry with myself when I make a mistake"), which was employed as an indicator of PS, and Socially Prescribed Perfectionism (e.g., "My teachers expect my work to be perfect"), which was employed as an indicator of PC. Participants were awarded 5-point grades for dealing with each item. The Spanish-translated version by Castro et al. (2004) was used in our study. This is a reliable instrument for research purposes (Vicent et al., 2017). In its original validation, the SPP obtained adequate indexes of internal consistency and test-retest reliability (α = 0.81; tr = 0.74). Castro et al. (2004) applied a version of the CAPS translated into Spanish, reporting acceptable levels of reliability and temporal stability for the Socially Prescribed Perfectionism and Self-Oriented Perfectionism that varied between α = 0.82 and 0.92 for a clinical and non-clinical sample of Spanish adolescent women. In this study, the Cronbach's α coefficients were α = 0.72 for Self-Oriented Perfectionism and α = 0.75 for Socially Prescribed Perfectionism.

The Spanish version of the Aggression Questionnaire (AQ) developed by Santisteban and Alvarado (2009) was also used. Buss and Perry (1992) made the original version. The Spanish version was validated in pre-adolescent sample (age: 9–11 years). It consists of 29 items of a 5-point Likert (1 – uncharacteristic of me to 5 – very characteristic of me). This questionnaire provides a global measure of aggression and four subscales: physical aggression, with nine items; verbal aggression, with five items; anger, with seven items; and hostility, with eight items. This version obtained acceptable reliability indices for the four factors (Physical Aggression = 0.80, Verbal Aggression = 0.73, Anger = 0.65, and Hostility = 0.66) was used for this study. Examples of items per scale are: Physical Aggression (e.g., "If someone hits me, I respond by hitting him too"), Verbal Aggression (e.g., "When people do not agree with me, I cannot help arguing with them"), Anger (e.g., "Sometimes I feel like a bomb about to explode"), and Hostility (e. g., "When people are especially friendly, I wonder what they want").

Procedure

First, the authorization of the ethics committee for the development of the research was processed. Next, the high schools were selected. After the above, interviews were held with the directors and/or counselors of the educational centers to present the objectives, describe the evaluation instruments, request their permission, and promote their collaboration. In parallel, the authorization of the parents or legal representatives of the students and the consent of the students themselves were obtained. During the application session (lasting approximately 50 min) for evaluation of the instruments, the students were informed of the voluntariness, anonymity, and confidentiality of the study. The response templates were then coded and entered into a database for statistical treatment.

About 220 students did not take part in the study because they did not give informed consent or because their questionnaires were incomplete. Study participants participated in the study after informed written consent was obtained from both the minors and their parents.

Data Analysis

A Latent Class Analysis (LCA) was used to identify the different groups of perfectionists. The best model was selected by analyzing the most appropriate values, i.e., the lowest values of the Bayesian Information Criteria (BIC) and entropy values close to 1 (Schreiber, 2017). The groups were defined according to their levels of PS and PC dimensions. ANOVA was used to examine the inter-class differences in the different manifestations of aggression. Cohen's d test was calculated to estimate the magnitude of the differences (Cohen, 1998), considering small (between 0.20 and 0.49), moderate (between 0.50 and 0.79), and large effect sizes (higher than 0.80). Data were analyzed using the statistical package SPSS v22 and the Excel package XLSTAT to run the latent class analyses.

Ethics Approval

The study protocols were approved by the Ethics Committee for Clinical Investigations of the University of Murcia (ID: 1405/2016). Moreover, this study was performed in accordance with the approved guidelines and the Declaration of Helsinki, with parental written informed consent obtained from all participants.

RESULTS

Table 1 outlines the Pearson's correlations between the variables under study and the descriptive statistics (Mean and SD).

There was a significant positive correlation between physical aggression and PC. Likewise, significant and positive correlations were found between verbal aggression, anger, hostility, PS, and PC. Therefore, it was relevant to proceed to the LCA.

The models obtained (from two to six classes) by LCA are shown in **Table 2**. Since a lower value of BIC and a higher entropy are the best indicators of the number of classes, among all the models, the model that had the most suitable BIC with the highest entropy values was selected, i.e., the 3-class model. This class solution was composed of three different perfectionism groups: (a) a first group of 717 students (66.8%) called Non-Perfectionists, since this group was characterized by low levels of both PC and PS; (b) a second group of 257 students (23.9%) called Maladaptive Perfectionists, characterized by high levels of PC and moderate levels of PS; and (c) a third group of 100 students (9.3%) called Adaptive Perfectionists, characterized by moderate scores in both perfectionism dimensions.

Table 3 presents the results of the ANOVAs that revealed significant differences between classes. Different types of PC and PS showed statistically significant differences regarding the four components of aggression behavior.

In **Table 4**, *post hoc* comparisons revealed that Non-Perfectionists obtained significantly lower scores in physical aggression, anger, and hostility than Maladaptive Perfectionists. Non-Perfectionists obtained significantly higher scores in physical aggression, verbal aggression, anger, and hostility than Adaptive Perfectionists. Similarly, *post hoc* comparisons revealed that Maladaptive Perfectionists obtained significantly higher scores in physical aggression, verbal aggression, anger, and hostility than Adaptive Perfectionists. Small effect sizes were found for all differences with the exception of Adaptive vs. Maladaptive contrasts on anger and hostility which were of a moderate magnitude.

TABLE 1 | Pearson correlation between the variables of study and the descriptive statistics.

Variable	PS	PC	*M*	*SD*
Physical aggression	0.053	0.132**	20.21	7.17
Verbal aggression	0.080**	0.088**	11.28	3.90
Anger	0.182**	0.134**	17.84	5.01
Hostility	0.163**	0.203**	19.75	5.53
PS			39.46	6.40
PC			32.85	6.77

**$p < 0.01$.

TABLE 2 | The fits for the results of the latent class analysis of the study.

Account of classes	BIC	Entropy
2	8558.298	0.54
3	8452.512	0.59
4	8464.877	0.58
5	8468.985	0.55
6	8493.390	0.55

BIC, Bayesian Information Criterion.

DISCUSSION

This study allowed examining the existence of different classes of perfectionists according to their degree on the PS and PC dimensions: (a) a first group of 717 students, called Non-Perfectionists; (b) a second group of 257 students, called Maladaptive Perfectionists; and (c) a third group of 100 students, called Adaptive Perfectionists. Previous studies performed with techniques close to that employed in this study (i.e., LCA) also showed the existence of three clusters similar to those obtained in our study (Gilman et al., 2014; Moate et al., 2016; Wang et al., 2016). However, as it was expected, the three-class solution obtained in this study did not confirmed the four clusters identified by Vicent et al. (2017) which can be explained by the profile extraction method employed. Thus, as has been mentioned in the introduction section, Vicent et al. (2019b) used a non-hierarchical cluster analysis, whereas in this study, a more appropriate technique was employed (i.e., LCA).

On the other hand, the prevalence rates of the three classes identified in our study do not coincide with those of other previous studies, possibly due to the different instruments employed to assess perfectionism, as well as the sample characteristics such as cultural or age aspects (Non-Perfectionist = 66.7%; Maladaptive Perfectionist = 24%; and Adaptive Perfectionist = 9.3%).

Attending to the second aim of this study, significant differences were found in the different manifestations of aggression between the observed perfectionism classes. Thus, as expected consistently to Sherry et al. (2016), Maladaptive Perfectionists presented higher values in physical aggression, verbal aggression, anger, and hostility than Adaptive Perfectionists and Non-Perfectionists. It indicates that those adolescents with high values of both PC and PS (i.e., maladaptive perfectionists), can be more frequently involved in actions related to anger, hostility, or aggressiveness, either physical or verbal. On the other hand, Adaptive Perfectionists, with moderate levels on PS and PC, presented lower scores on the four components of aggression behavior in comparison with Non-Perfectionists. That is, young people classified as Non-Perfectionists presented a risk value in terms of aggression behavior, in comparison with Adaptive Perfectionists, so they need greater intervention to manage situations of anger, hostility, or physical and verbal aggression.

According to Hewitt et al. (2008), one of the core features of perfectionism is the need to be perfect. Researchers have also found that perfectionist self-presentation, defined as the need to appear as perfect in front of other, is associated with perfectionism dimensions of PS and PC (Hewitt et al., 2003). In addition, perfectionism is linked with several factors of psychological vulnerability, such as low self-esteem and symptoms of anxiety and depression (Hewitt et al., 1995, 2003). Therefore, this appearance of perfection in front of others can generate

TABLE 3 | Mean scores, SDs, and *post hoc* contrasts obtained by the perfectionist classes on the different manifestations of aggression behavior.

Variable	Non-Perfectionists		Maladaptive Perfectionists		Adaptive Perfectionists		Significance		
	M	*SD*	*M*	*SD*	*M*	*SD*	*F(2,1,071)*	*p*	*ηp2*
Physical aggression	20.11	7.05	21.38	7.50	17.95	6.60	8.62	<0.001	0.16
Verbal aggression	11.26	3.81	11.84	4.18	10.09	3.56	7.42	0.001	0.14
Anger	17.66	4.86	19.19	5.16	15.75	4.69	19.16	<0.001	0.35
Hostility	19.44	5.36	21.62	5.85	17.21	4.42	27.67	<0.001	0.49

TABLE 4 | Cohen's *d* indexes for *post hoc* contrast groups.

Variable	Non-perfectionists vs. Maladaptive Perfectionists	Non-perfectionists vs. Adaptive Perfectionists	Adaptive Perfectionists vs. Maladaptive Perfectionists
Physical aggression	0.17*	0.31*	0.47***
Verbal aggression	n.s.	0.31*	0.44***
Anger	0.31***	0.39**	0.68***
Hostility	0.40***	0.42**	0.80***

*$p < 0.05$; **$p < 0.01$; ***$p < 0.01$.

rejection and distancing from peers, leading to isolation, rejection, and victimization (Hewitt et al., 1995) which would be in line with the findings of this study.

In line with what was found in this study, there is great evidence in the literature on the relationship between PC and anger (Sherry et al., 2007; Hewitt and Flett, 2010; Saleh-Esfahani and Ali-Besharat, 2010). Some authors explain this relationship through frustration and the perception of humiliation felt by the subject. In the same way, there is agreement between the findings of this study and the previous literature regarding the relationship between hostility and PC. A person who is hostile and insecure will attribute his or her hostility to the environment. Thus, in a family environment, it has been suggested that perfectionists, due to their own evaluative concerns, may interpret any mild admonition from their parents as harsh criticism (Saleh-Esfahani and Ali-Besharat, 2010). Although there is less prior evidence for this, some authors, such as García-Fernández et al. (2017) and Öngen (2010), have shown a significant and positive relationship between PC and physical and verbal aggressiveness.

Regarding the relationship between PS and aggression behavior, Sherry et al. (2007) argued that individuals with high levels of PS are hypercompetitive, and this capacity can make them feel hostile toward others. In contrast, Stoeber et al. (2017) found that those with high PS may show more hostility, distrust, verbal aggression, and aggressive feelings, but it is their higher level of other oriented and socially prescribed types of perfectionism, which are responsible for these characteristics, not their higher levels of PS. In addition, PC generates social disconnection that may imply impaired interpersonal relationships (Sherry et al., 2016). However, according to our results, it seems that individuals characterized by high levels of both PS and PC dimensions reported the highest levels of aggression behavior. Even though there is a debate about the adaptive or the maladaptive nature of PS, most authors point out PC as a maladaptive construct (Sherry et al., 2016) which support it relation to different types of aggression. Hewitt et al. (2006) explain why perfectionism is associated with social disconnection and interpersonal hostility. They used three samples of college students (Ns = 318, 417, and 398) and completed measures of perfectionism and hostility (including aggression, anger, and spite). Their findings indicate that not all perfectionists feel socially disconnected and hostile toward others. Self-oriented perfectionists may feel socially connected and show no more hostility than non-perfectionists. In addition, as Dunkley and Blankstein (2000) suggest, PS are strongly correlated to PC that may be in the basis of their characterization of positive correlation between PS and PC dimensions and aggressive behavior.

In summary, this study has addressed the relationship between PC and PS with aggression behavior, considering its four components: anger, hostility, physical aggression, and verbal aggression.

One of the contributions of this study is its use of more powerful analysis tools, such as LCA, to confirm the existence of three perfectionism profiles (Adaptive Perfectionism, Maladaptive Perfectionism, and Non-Perfectionism) in Spanish adolescents. In addition, this study evidenced the relationship between the different profiles of perfectionism and aggression behavior, highlighting the strong need to work in schools to improve the social skills of subjects with perfectionist traits. Subjects characterized by high levels of PC will show higher physical and verbal aggression behaviors, incited by anger toward people who have imposed high standards on them, when said standards are not met. On the other hand, when these students are not able to satisfy the demands of others, given their PC, they will tend to perceive their environment as too critical and harsh. Thus, aggressive behaviors toward others can emerge in an attempt to defend themselves from an environment that they perceive as hostile (Vicent et al., 2019c). In addition, subjects characterized by high levels of PS showed competitive behaviors leading them to generate hostility toward others. This hostility can turn into anger or verbal aggression depending on the pressure that the subject feels in each situation to be the best (Vicent et al., 2017), although the reasons for PS and PC are diverse, both positively and significantly correlate with aggression behavior.

This study has some limitations. Firstly, it should be noted that the use of a cross-sectional design did not allow us to establish causal relationships and that longitudinal and experimental studies should be used to establish causal relationships between perfectionism and aggressiveness. Although this is a considerable sample in terms of its size, all our participants were recruited in the Region of Murcia, so it is not possible to generalize the results to the entire Spanish population. Other studies should be carried out with representative samples at the national or transnational level to allow generalization of the results. Furthermore, in this study, despite collecting gender data, no differential analyses were performed for this variable. It would be interesting to establish these differences in light of the other previous studies cited in this work.

CONCLUSION

In conclusion, the results of this work show three to four profiles of adolescent perfectionism. Its relationship with aggressiveness is analyzed, distinguishing between physical and verbal aggressiveness, anger, and hostility. This work tries to overcome the limitations of the study by Vicent et al. (2017), trying to analyze the relationship between perfectionism and the four components of aggressiveness from a person-oriented approach, which contributes to greater knowledge on the subject.

Despite its limitations, the present work has several practical implications. Hence, social skills programs can improve school coexistence and may help deal with perfectionism, addressing both PS and PC facets. Therefore, future programs to prevent aggression in the school should consider including programs to reduce levels of perfectionism.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the University of Murcia, 1405/2016. Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin.

AUTHOR CONTRIBUTIONS

IM and CR-E: conceptualization, investigation, and data curation. IM and AF-S: methodology. IM and JA: formal analysis. All authors: writing – original draft preparation, writing – review and editing, and supervision. All authors contributed to the article and approved the submitted version.

REFERENCES

Bardone-Cone, A. M., Wonderlich, S. A., Frost, R. O., Bulik, C. M., Mitchell, J. E., Uppala, S., et al. (2007). Perfectionism and eating disorders: current status and future directions. *Clin. Psychol. Rev.* 27, 384–405. doi: 10.1016/j.cpr.2006.12.005

Besser, A., Flett, G. L., and Hewitt, P. L. (2004). Perfectionism, cognition, and affect in response to performance failure vs success. *J. Ration. Emot. Cogn. Behav. Ther.* 22, 301–328. doi: 10.1023/B:JORE.0000047313.35872.5c

Blatt, S. J., D'Afflitti, J. P., and Quinlan, D. M. (1976). Experiences of depression in normal young adults. *J. Abnorm. Psychol.* 85, 383–389. doi: 10.1037/0021-843X.85.4.383

Buss, A. H., and Perry, M. (1992). The aggression questionnaire. *J. Pers. Soc. Psychol.* 63, 452–459. doi: 10.1037/0022-3514.63.3.452

Castro, J., Gila, A., Gual, P., Lahortiga, F., Saura, B., and Toro, J. (2004). Perfectionism dimensions in children and adolescents with anorexia nervosa. *J. Adolesc. Health* 35, 392–398. doi: 10.1016/S1054-139X(04)00052-7

Cohen, J. (1998). *Statistical Power Analysis for the Behavioral Sciences*. NY, USA: Academic Press.

Dunkley, D. M., and Blankstein, K. R. (2000). Self-critical perfectionism, coping, hassles, and current distress: A structural equation modeling approach. *Cogn. Ther. Res.* 24, 713–730. doi: 10.1023/A:1005543529245

Flett, G. L., Hewitt, P. L., Besser, A., Su, C., Vaillancourt, T., Boucher, D., et al. (2016). The child-adolescent perfectionism scale: development, psychometric properties, and associations with stress, distress, and psychiatric symptoms. *J. Psychoeduc. Assess.* 34, 634–652. doi: 10.1177/0734282916651381

Frost, R. O., Marten, P., Lahart, C., and Rosenblate, R. (1990). The dimensions of perfectionism. *Cogn. Ther. Res.* 14, 449–468. doi: 10.1007/BF01172967

García-Fernández, J. M., Inglés, C. J., Vicent, M., Gonzálvez, C., Gómez-Núñez, M. I., and Poveda-Serra, P. (2016). Perfeccionismo durante la infancia y la adolescencia. Análisis bibliométrico y temático (2004-2014). *Rev. Iberoam. Psicol. Salud.* 7, 79–88. doi: 10.1016/j.rips.2016.02.001

García-Fernández, J. M., Vicent, M., Ingles, C. J., Gonzálvez, C., and Sanmartín, R. (2017). Relación entre el perfeccionismo socialmente prescrito y la conducta agresiva durante la infancia tardía. *EJEP* 10, 15–22. doi: 10.1016/j.ejeps.2016.10.003

Gilman, R., Rice, K. G., and Carboni, I. (2014). Perfectionism, perspective taking, and social connection in adolescents. *Psychol. Sch.* 51, 947–959. doi: 10.1002/pits.21793

Habke, A. M., and Flynn, C. A. (2002). "Interpersonal aspects of trait perfectionism," in *Perfectionism: Theory, Research, and Treatment*. eds. G. L. Flett and P. L. Hewitt (Washington, DC: American Psychological Association), 151–180.

Hewitt, P. L., and Flett, G. L. (1991). Perfectionism in the self and social contexts: conceptual assessment, and association with psychopathology. *J. Pers. Soc. Psychol.* 60, 456–470. doi: 10.1037/0022-3514.60.3.456

Hewitt, P. L., and Flett, G. L. (2004). *Multidimensional Perfectionism Scale (MPS): Technical Handbook*. Toronto: Multi-Health Systems.

Hewitt, P. L., and Flett, G. L. (2010). "Perfectionism" in *The Corsini encyclopedia of psychology*. 1–2.

Hewitt, P. L., Flett, G. L., and Ediger, E. (1995). Perfectionism traits and perfectionistic self-presentation in eating disorder attitudes, characteristics, and symptoms. *Int. J. Eat. Disord.* 18, 317–326. doi: 10.1002/1098-108X(199512)18:4<317::AID-EAT2260180404>3.0.CO;2-2

Hewitt, P. L., Flett, G. L., Sherry, S. B., and Caelian, C. F. (2006). "Trait perfectionism dimensions and suicidal behavior" in *Cognition and suicide: Theory, research, and therapy.* ed. T. E. Ellis (American Psychological Association), 215–235.

Hewitt, P. L., Flett, G. L., Sherry, S. B., Habke, M., Parkin, M., Lam, R. W., et al. (2003). The interpersonal expression of perfection: perfectionistic self-presentation and psychological distress. *J. Pers. Soc. Psychol.* 84, 1303–1325. doi: 10.1037/0022-3514.84.6.1303

Hewitt, P., Habke, A., LeeBaggley, D. L., Sherry, S. B., and Flett, G. L. (2008). The impact of perfectionistic self-presentation on the cognitive, affective, and physiological experience of a clinical interview. *Psychiatry* 71, 93–122. doi: 10.1521/psyc.2008.71.2.93

Moate, R. M., Gnilka, P. B., West, E. M., and Bruns, K. L. (2016). Stress and burnout among counselor educators: differences between adaptive perfectionists, maladaptive perfectionists and nonperfectionists. *J. Couns. Dev.* 94, 161–171. doi: 10.1002/jcad.12073

Öngen, D. E. (2010). The relationships between adaptive and maladaptive perfectionism and aggression among Turkish adolescents. *Aust. J. Guid. Couns.* 20, 99–108. doi: 10.1375/ajgc.20.1.99

Saleh-Esfahani, F. S., and Ali-Besharat, M. A. (2010). Perfectionism and anger. *Procedia Soc. Behav. Sci.* 5, 803–807. doi: 10.1016/j.sbspro.2010.07.188

Sánchez de la Flor, P. (2018). Diferencias individuales en agresividad juvenil: una revisión. *Psicopatol. Clín. Leg. Forensic* 18, 94–111.

Santisteban, C., and Alvarado, J. M. (2009). The aggression questionnaire for Spanish preadolescents and adolescents: AQ-PA. *Span. J. Psychol.* 12, 320–326. doi: 10.1017/S1138741600001712

Schreiber, J. B. (2017). Latent class analysis: an example for reporting results. *Res. Soc. Adm. Pharm.* 13, 1196–1201. doi: 10.1016/j.sapharm.2016.11.011

Sherry, S. B., Hewitt, P. L., Flett, G. L., Lee-Baggley, D. L., and Hall, P. A. (2007). Trait perfectionism and perfectionistic self-presentation in personality pathology. *Pers. Individ. Differ.* 42, 477–490. doi: 10.1016/j.paid.2006.07.026

Sherry, S. B., Mackinnon, S. P., and Gautreau, C. M. (2016). "Perfectionists do not play nicely with others: expanding the social disconnection model," in *Perfectionism, Health, and Well-Being*. eds. F. M. Sirois and D. S. Molnar (Cham: Springer), 225–243.

Slaney, R. B., Rice, K. G., Mobley, M., Trippi, J., and Ashby, J. S. (2001). The revised almost perfect scale. *Meas. Eval. Couns. Dev.* 34, 130–145. doi: 10.1080/07481756.2002.12069030

Stoeber, J. (2018). "The psychology of perfectionism. An introduction," in *The Psychology of Perfectionism: Theory, Research, Applications*. ed. J. Stoeber (London: Routledge), 3–16.

Stoeber, J., Harvey, L. N., Almeida, I., and Lyons, E. (2013). Multidimensional sexual perfectionism. *Arch. Sex. Behav.* 42, 1593–1604. doi: 10.1007/s10508-013-0135-8

Stoeber, J., Noland, A., Mawenu, B., Henderson, T. W., Kent, T. M., and D. N., (2017). Perfectionism, social disconnection, and interpersonal hostility: not all perfectionists don't play nicely with others. *Pers. Individ. Differ.* 119, 112–117. doi: 10.1016/j.paid.2017.07.008

Vicent, M., Gonzálvez, C., Sanmartín, R., Fernández-Sogorb, A., Cargua-García, N. I., and García-Fernández, J. M. (2019a). Perfectionism and school anxiety: more evidence about the 2 × 2 model of perfectionism in an Ecuadorian population. *Sch. Psychol. Int.* 40, 474–492. doi: 10.1177/0143034319859047

Vicent, M., Inglés, C. J., Gonzálvez, C., Sanmartín, R., Aparicio-Flores, M. P., and García-Fernández, J. M. (2019b). Perfectionism profiles and academic causal self-attributions in Spanish primary education students. *Rev. Psicodidact.* 24, 103–110. doi: 10.1016/j.psicoe.2019.02.002

Vicent, M., Inglés, C. J., Sanmartín, R., Gonzálvez, C., and García-Fernández, J. M. (2017). Perfectionism and aggression: identifying risk profiles in children. *Pers. Individ. Differ.* 112, 106–112. doi: 10.1016/j.paid.2017.02.061

Vicent, M., Rubio-Aparicio, M., Sánchez-Meca, A., and Gonzálvez, C. A. (2019c). Reliability generalization meta-analysis of the child and adolescent perfectionism scale. *J. Affect. Disord.* 245, 533–544. doi: 10.1016/j.jad.2018.11.049

Wang, K. T., Permyakova, T. M., and Sheveleva, M. S. (2016). Assessing perfectionism in Russia: classifying perfectionists with the short almost perfect scale. *Personal. Individ. Differ.* 92, 174–179. doi: 10.1016/j.paid.2015.12.044

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Emotional Intelligence, Perceived Academic Self-Efficacy, and Perfectionistic Automatic Thoughts as Predictors of Aesthetic-Musical Awareness in Late Adolescence

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Aesthetic-musical awareness demarcates a person's own perception of their ability to connect with music and the emotions it evokes. This may imply a benefit for the affective state of the individual. Therefore, the aim of this study was to observe whether there are statistically significant differences in emotional intelligence, perceived academic self-efficacy, and perfectionistic automatic thoughts when there are high and low scores in aesthetic-musical awareness in late adolescence. Likewise, we also aimed to determine whether emotional intelligence, perceived academic self-efficacy, and perfectionistic automatic thoughts are predictors of high aesthetic-musical awareness. To this end, a sample of 798 Spanish students between 17 and 23 years of age (M_{age} = 18.5 years) was used. Statistically significant differences were found for the dimensions of each variable when there were high and low scores in aesthetic-musical awareness (scores between $d = -0.31$ and -0.40), with higher mean scores for emotional intelligence, perceived academic self-efficacy, and perfectionistic automatic thoughts being present in the group with high aesthetic-musical awareness. Likewise, it was observed that the probability of presenting high scores in aesthetic-musical awareness was higher when there was an increase in emotional intelligence, perceived academic self-efficacy, and perceived automatic thoughts. In conclusion, the results found demonstrate that both emotional intelligence, perceived academic self-efficacy, and the presence of perfectionistic automatic thoughts influence on whether an individual has greater aesthetic-musical awareness. Taking into account previous studies that show how music influences the well-being of the person, these findings show a favorable link for the design of programs that benefit the emotional state of adolescents.

Keywords: aesthetic-musical awareness, aesthetic desire, emotional intelligence, academic self-efficacy, perfectionistic automatic thoughts

INTRODUCTION

Awareness, attention, and understanding of emotions are essential to accurately identify a person's emotional state (Chong-Leung and Cheung, 2020). This directly influences an individual's quality of life (Boden et al., 2015) and mental health (Lieberman et al., 2011), especially in the case of adolescence (Ciarrochi et al., 2011), which is characterized as a stage in which very intense emotions are experienced, but in which the skills to regulate them are not yet fully developed (Dingle et al., 2016).

Research that focuses on the emotions evoked by music is increasing due to the great adaptive power that music has for humans not only on an emotional level but also in terms of attachment and social and cultural belonging (Hunter and Schellenberg, 2010; Fritz et al., 2013; Koelsch, 2018, 2020; Ehrlich et al., 2019; Varner, 2019). Music is a medium that amplifies and alters emotions, especially for adolescents (Chong-Leung and Cheung, 2020). It influences emotion regulation (Stewart et al., 2019), while generating emotional well-being and increased awareness (Dingle et al., 2016).

According to Koelsch (2018), music can arouse different emotional, cognitive, and physiological components. These emotional components are interrelated with high Aesthetic-Musical Awareness (AMA), which is a dimension of Aesthetic Desire that is also known as one's self-awareness of the ability to connect with music and the emotions it evokes (Aparicio-Flores et al., 2020a). In other words, the pleasurable affect generated by music is linked to deeper psychophysiological and cognitive aspects, ranging from emotion regulation to emotion arousal (Saarikallio et al., 2018). However, in this process, there is a conscious step involved which is the AMA.

In terms of its general conceptualization, Aesthetic Desire is understood as the emotional sensitivity that generates pleasant stimuli when observing or creating a work of art (Lundy et al., 2010; Aparicio-Flores et al., 2020a). This is a variable that has been recently studied and intervenes with the affective processes generated by plastic or architectural works of art, the beauty of one's surroundings, and musical works (Koelsch, 2018; Aparicio-Flores et al., 2020a).

Nowadays, the study of Aesthetic Desire is encouraged due to its relevance in aspects such as the frequency with which it is generated in an individual's day-to-day life and the psychological well-being it can promote for them (Saarikallio et al., 2018). The need to further understand this construct is also implied considering that a work of art, in this case pertaining to music, can be evaluated as something positive even though it triggers a negative feeling (e.g., melancholy) (Brattico et al., 2016; Koelsch, 2018). Taking this into account, it is relevant to inquire into people's AMA in order to observe whether this allows for the design of effective strategies for the regulation of an individual's emotions.

Being aware of one's feelings is greatly significant given the benefits that it can bring both at the interpersonal and intrapersonal levels (Karimi, 2021). Therefore, having high Emotional Intelligence (EI) is important because this is the ability to perceive, understand, and regulate one's emotions (Salovey and Mayer, 1990). As such, observing the link between EI and AMA can be of significance for people's daily lives, as well as for educational and therapeutic purposes.

Emotion is an affective experience that prepares humans to adapt to a particular environment, with its basic function being survival (Lorenzo-de Reizábal, 2019). Several studies claim that a change in emotional state can be clearly noted when listening to music, without this being conditional to whether the listener has had previous musical experience or even whether the individual has been governed by a particular personality trait (Mohn et al., 2011; Saarikallio et al., 2018; Lorenzo-de Reizábal, 2019). In fact, some functional neuroimaging studies claim that music acts on various brain structures that have direct involvement with emotions, such as the hippocampus, hypothalamus amygdala, and auditory cortex, among others (Koelsch, 2014, 2020; Koelsch and Skouras, 2014).

However, in the development of the teaching-learning process regarding emotional competence, and consequently EI, learning to be aware of one's own emotions is established as a fundamental step (Mayer et al., 2000; Lorenzo-de Reizábal, 2019). In this regard, authors such as Bisquerra (2017) note that listening to music is a way to allow this process to happen since at the same time that one discovers that an emotion has been evoked, they regulate it, which implies that it can be of great use for emotional education.

It seems as though EI is related to music listening (Londsdale, 2018). Many people listen to music to control their emotional state (Londsdale and North, 2011). To this end, these individuals must have a greater level of recognition and management of their own emotions. In other words, they need to have developed EI, with the use of music depending, in part, on the level of EI acquired (Londsdale, 2018).

However, for most people, music is a recreational and motivating activity, in which the emotions experienced while listening are not consciously analyzed (Lorenzo-de Reizábal, 2019). In fact, music can generate different emotions depending on the person listening to it (Kawakami et al., 2013), and even if the same emotion is felt, it can be experienced with different intensities (Schubert, 2013). For this reason, music does not only influence the reflection of the emotions felt but also can serve as a motivational strategy, a source of enjoyment (Lorenzo-de Reizábal, 2019), a tool to regulate emotions whatever the intensity (Stewart et al., 2019), and even as a verbal tool for the communication of such emotions (Kragness and Trainor, 2019).

Considering the role that music can have in triggering EI, and that EI is decisive for people's well-being socially (Nikooyeh et al., 2017), emotionally (Bucich and MacCann, 2019), and cognitively (Nirmala-Wijekoon et al., 2017), as well as it also being relevant at adolescence due to the characteristics of the stage and the search for one's own identity (Bucura, 2019), it is important to analyze the connection between EI and AMA in late adolescence.

On the other hand, this can be important for adolescence, being that it is a stage in which young people are immersed in their studies and are reflecting on their interests and the cognitive abilities that will improve their future career. In this sense, it is worth highlighting Academic Self-Efficacy (ASE), which is understood as one's belief about their own ability to achieve a

goal, in this particular case, academic goals (García-Fernández et al., 2016b; Yokoyama, 2019) This may contribute to higher academic performance (García-Fernández et al., 2016a; Honicke and Broadbent, 2016; Yokoyama, 2019) and the adoption of metacognitive strategies (Asghar-Hayat and Shateri, 2019), as well as dispositional empathy (Aparicio-Flores et al., 2020b), motivation (Ross et al., 2016), and academic resilience (Cassidy, 2015). It is therefore valuable to observe the relationship between ASE and AMA.

The essential external factors that affect individuals are aspects such as education, employment, motivation, and the need for a sense of achievement, among others (Hasanuddin and Sjahruddin, 2017). As such, it is important to obtain a high level of ASE that influences academic performance (Honicke and Broadbent, 2016; Yokoyama, 2019), as well as emotional and social aspects (Bucura, 2019; Aparicio-Flores et al., 2020c). In fact, it should be considered that a person's performance is not only observed in terms of their work capacity but also regarding their self-control, and even social relationships (Hasanuddin and Sjahruddin, 2017).

It has been shown that it is possible to regulate and control people's behavior in learning contexts (Agina et al., 2011). However, this depends on the pedagogical approach employed by educational professionals (Fernández-Rio et al., 2017). It has also been observed that the higher the self-regulated learning in students, the higher their ASE (Fernández-Rio et al., 2017). As such, there is a certain significance in nurturing students with strategies that promote the regulation of their own learning and behavior.

Adolescents tend to lead a rich and active musical life (Campbell et al., 2007). However, this does not imply that they possess a high level of efficacy in their music lessons. This is where ASE, among other components, influences the final outcome (Bucura, 2019).

Background music as a learning style, although it does not influence ASE, has a positive impact on the students' sense of achievement, bringing happiness, motivation, and greater enjoyment for a task, which has an impact on their academic success (Can and Güven, 2020) and results in less mental effort and time spent on the task (Lesiuk, 2005; Lim and Bang, 2018). Similarly, musical training influences emotional perception and mental imagery capacity, which contributes to academic learning (Commodari and Sole, 2019). Moreover, musical activity facilitates social bonding among students, promotes tolerance to diversity, and motivation for learning (Cores-Bilbao et al., 2019).

Considering the benefits of musical listening at the level of academic performance, and that musical pleasure comprises feelings of relaxation, joy, and power (Saarikallio et al., 2018), and without observing studies that analyze the direct link between AMA and ASE, it would be relevant to analyze the role of AMA on ASE in late adolescence.

Likewise, it should be considered that the demands of our current society are governed by perfect standards. In this regard, the adolescent stage may be conditioned to follow a pattern based on excellence at any level (e.g., physical, academic, social). As such, special attention should be paid to Perfectionistic Automatic Thoughts (PATs), which are understood as automatic reflections that are based on the desire to be perfect (Flett et al., 1998, 2012; Esteve-Faubel et al., 2020). These thoughts have a negative influence at the academic (Desnoyers and Arpin-Cribbie, 2015; Flett et al., 2019), physical (Flett et al., 1998, 2012; Kirtley et al., 2015), social (Aparicio-Flores et al., 2020c), and emotional level (Flett et al., 1998; Macedo et al., 2017; Aydin and Yerin-Güneri, 2020; Esteve-Faubel et al., 2020; Tyler et al., 2021). For this reason, it would be necessary to reflect on the connection that exists between AMA and PATs in order to determine whether AMA can positively influence strategies that enhance these perfectionistic reflections.

Perfectionism is known as a personality trait that negatively affects people who suffer from it given that it is determined by the establishment of very high and immoderate standards for the achievement of a proposed goal (Smith et al., 2021). Deriving from the more cognitive part, PATs are about specific ruminations of perfectionism (Flett et al., 2012).

A person with perfectionistic traits tends to demand an excessive quality of performance from themself in any task, therefore generating high levels of anxiety (Sarikaya and Kurtaslan, 2018). In this regard, some musicians have not been able to give any scheduled concerts throughout their professional life due to their high levels of anxiety (Kenny, 2011).

However, while music performances can generate high levels of stress and anxiety due to PATs (Flett et al., 2016; Aydin and Yerin-Güneri, 2020; Tyler et al., 2021), several studies claim that people with high levels of stress or emotionally negative experiences tend to listen more to music as a way of controlling their mood (Getz et al., 2012, 2014) because music listening has the power to decrease tension, anxiety, and stress (Lim and Bang, 2018). In other words, performing, and doing so on a crowded stage, is not the same as listening to music with the purpose of achieving a state of relaxation. Similarly, neither music performance nor listening, which have a positive or negative impact on the anxiety caused by perfectionism (Flett et al., 1998; Sarikaya and Kurtaslan, 2018; Aydin and Yerin-Güneri, 2020; Tyler et al., 2021), are the same as AMA.

There is little research based on perfectionism and music, and there is even less concrete research on the link between music and PATs. However, despite observing some research that supports this positive or negative link, depending on the case to be examined, there is a lack of research showing related findings between PATs and AMA.

Given the characteristics of AMA, which generate a specific internal and emotional knowledge of a person, it could have a beneficial influence on the design of strategies for the prevention of PATs and the regulation of other emotions of negative affect. Therefore, it is important to observe how AMA influences the PATs of the individual who presents them.

In the Current Study

The present study aims to: (a) analyze whether there are statistically significant differences in EI, ASE, and PATs in relation to high and low AMA scores in late adolescence; and (b) determine whether EI, ASE, and PATs are predictors of high AMA.

Taking into account the previous literature, it is expected that:

- *Hypothesis 1*: there are statistically significant differences in EI based on high and low AMA scores in late adolescence, and that EI is a predictor of high AMA (Mohn et al., 2011; Koelsch, 2014, 2020; Koelsch and Skouras, 2014; Saarikallio et al., 2018; Lorenzo-de Reizábal, 2019).
- *Hypothesis 2*: there are statistically significant differences in ASE based on high and low AMA scores in late adolescence, and that ASE is a predictor of high AMA (Lesiuk, 2005; Lim and Bang, 2018; Can and Güven, 2020).
- *Hypothesis 3*: there are statistically significant differences in PATs based on high and low AMA scores in late adolescence, and that PATs are predictors of high AMA (Getz et al., 2012, 2014; Lim and Bang, 2018).

METHOD

Participants

The participant sample was recruited under the accessibility criteria in the Faculty of Education at the University of Alicante.

A total of 824 students were selected. These were students who were in either their first or second academic year, and were studying degrees in either Early Childhood Education or Primary Education. The inclusion criteria were that the participants were future teachers so that the results are known to all of them and can apply interesting aspects in their future classrooms.

Twenty-two (2.67%) participants were excluded due to errors or omissions in the completion of the questionnaires, these being the only reasons for exclusion. Therefore, the final sample of 798 participants was achieved, with ages ranging between 17 and 23 years ($M_{age} = 18.5$; $SD = 3.2$), and with 70.3% being women.

Regarding the ethnicity of the participants, it should be noted that the vast majority of students were Spanish (92.23%). However, 3.88% were European, 2.01% Arab, 1.00% South American and 0.88% Asian. However, all of them had been living in Spain for more than 7 years.

Instruments

Trait Meta-Mood Scale 24 (TMMS-24; Fernández-Berrocal et al., 2004): The TMMS-24 is a Likert-type scale with 5 response points (1 = *Not agree at all*; 5 = *Strongly agree*) that assesses EI from 24 items and three dimensions: I. Attention to feelings (e.g.: I pay close attention to feelings); II. Mood repair (e.g.: I can come to understand my feelings); and III. Clarity of feelings (e.g.: When I'm sad I think of all the pleasures in life).

Reliability levels of the scale were acceptable for all dimensions ($\alpha = 0.89$, 0.90, and 0.85, respectively).

Academic Situations Specific Perceived Self-Efficacy Scale (SPSASS; García-Fernández et al., 2010). The Spanish version of the SPSASS, adapted from the original scale by Palenzuela (1983), is a Likert-type scale with four response options (1 = *Never*; 4 = *Always*), consisting of 10 items and a unidimensional structure. This scale measures self-efficacy expectations in educational situations for both high school and university students (e.g.: I think I can get through a semester quite easily, and even with very good grades).

The internal consistency of the instrument for this study was $\alpha = 0.88$.

Perfectionism Cognitions Inventory (PCI; Esteve-Faubel et al., 2020): The Spanish version of the PCI is an adaptation of the work done by Flett et al. (1998), which assesses PATs. The PCI is a Likert-type scale with 5 response options (1 = *Not at all*; 5 = *All the time*) and is composed of 17 items that make up three dimensions and a second-order factor. These dimensions measure: I. Perfectionistic Concerns (e.g.: I certainly have high standards); II. Perfectionistic Demands (e.g.: I've got to keep working on my goals); and III. Perfectionistic Strivings (e.g.: I expect to be perfect).

Reliability levels were acceptable for all 3 dimensions in the present study ($\alpha = 0.83$, 0.71, 0.86, respectively).

Desire For Aesthetic Scale (DFAS; Aparicio-Flores et al., 2020a): The Spanish version of the DFAS is an adaptation of the original version designed by Lundy et al. (2010), which assesses Aesthetic Desire. The DFAS is a Likert-type scale with seven response options (1= *Strongly Disagree*; 7 = *Strongly Agree*) and 11 items configured in three dimensions: I. Satisfaction with Aesthetic Beauty (SAB) (e.g.: In the past, when I've mod into a new apartment, office or dorm, one of the first things I do is decorate the walls with nice artwork); II. Aesthetic-Musical Awareness (AMA) (e.g.: Hearing gorgeous songs is a major motivator for me in daily life); III. Emotional State of Aesthetic Beauty (ESAB) (e.g.: I would not to be happy in an unattractive house).

Specifically, in this study, the AMA dimension was administered, which obtained adequate reliability indices ($\alpha = 0.72$).

Procedure

Firstly, a meeting was held with the teachers of the subjects in which the study questionnaires were to be administered, in order to inform them of the objectives and request their collaboration. Later, in another session, the participants were informed of the purpose of the study, they were asked for their informed consent, and they were told about their status as volunteers and about their anonymity.

Subsequently, the different tests were administered in the classroom within an estimated time of 45 min, during which a researcher was present.

The research was carried out under the recommendations of the ethical principles of the Declaration of Helsinki of 1964.

Data Analysis

Firstly, a Student's *T*-test was applied to study the differences in EI, ASE, and PATs according to the high and low AMA scores. To evaluate the magnitude of the differences found, Cohen's (Cohen, 1988) d index was included.

Secondly, to determine the predictive probability of EI, ASE, and PATs on high AMA, the statistical technique of logistic regression was applied, following the forward stepwise procedure based on the Wald statistic. The probability was estimated through the odds ratio (OR) in accordance with the following interpretation: if OR = > 1, for example, OR = 2, for each occurrence of the situation in the presence of

TABLE 1 | Differences in emotional intelligence, academic self-efficacy, and perfectionistic automatic thoughts in late adolescence according to high and low scores in aesthetic-musical awareness.

	Levene's test		Low scores		High scores		Statistical significance			
Dimensions	***F***	***p***	***M***	***SD***	***M***	***SD***	***t***	***g.l.***	***p***	***d***
A_TMMS	0.88	0.34	26.08	6.14	28.20	6.55	−3.37	424	0.001	−0.33
M_TMMS	5.53	0.01	24.85	6.10	27.04	6.72	−3.40	401.50	0.001	−0.34
C_TMMS	0.21	0.64	24.50	6.46	26.49	6.39	−3.14	424	0.002	−0.31
ASE_SPSASS	4.84	0.02	29.97	5.59	32.25	6.63	−3.82	413.06	<0.001	−0.37
PC_PCI	4.43	0.03	14.01	4.83	15.71	5.46	−3.32	405.92	0.002	−0.33
PD_PCI	7.17	0.01	13.52	3.20	14.68	2.60	−3.96	331.49	<0.001	−0.40
PS_PCI	0.00	1.00	22.08	5.51	23.83	5.31	−3.28	424	0.001	−0.32

A_TMMS, attention to feelings; M_TMMS, mood repair; R_TMMS, clarity of feelings; ASE_ SPSASS, academic self-efficacy; PC_PCI, perfectionistic concerns; PD_PCI, perfectionistic demands; PE_PCI, perfectionistic strivings.

the independent variable, there will be two times the variable present. If, on the other hand, OR = < 1, for example, OR = 0.5, the probability of that situation occurring in the absence of the independent variable will be 0.5 times lower than in its presence.

For the analysis of the quality and fit of the proposed models, the following indicators were considered: Nagelkerke's R^2, which indicates the percentage of variance explained by the model (Nagelkerke, 1991); and the diagnostic efficiency, that is, the percentage of cases correctly classified by the model.

It should be noted that AMA was dichotomized according to low scores (percentile = > 25) and high scores (percentile = < 75).

RESULTS

Differences in Emotional Intelligence, Academic Self-Efficacy, and Perfectionistic Automatic Thoughts in Late Adolescence With High and Low Scores in Aesthetic-Musical Awareness

Table 1 shows the statistically significant differences obtained in EI, ASE, and PATs for late adolescence in accordance with high and low AMA scores. The observed differences were statistically significant, and were also of small magnitude, for all EI, PATs, and ASE factors. Thus, the results show that all three EI factors, attention to feelings ($M = 28.20$; $SD = 6.55$), mood repair ($M = 27.04$; $SD = 6.72$) and clarity of feelings ($M = 26.49$; $SD = 6.39$), score higher in the high AMA scores compared with the low AMA group.

Likewise, higher ASE scores are obtained for the group with high scores as opposed to the group with low AMA scores ($M = 32.25$; $SD = 6.63$).

On the other hand, the high AMA profile vs. the low AMA profile obtained higher scores in perfectionistic concerns ($M = 15.71$; $SD = 5.46$), perfectionistic demands ($M = 14.68$; $SD = 2.60$), and perfectionistic strivings ($M = 23.83$; $SD = 5.31$).

Predictive Capacity of the Variables Emotional Intelligence, Academic Self-Efficacy, and Perfectionistic Automatic Thoughts on Aesthetic-Musical Awareness

As can be seen in **Table 2**, two logistic regression models have been created from which correct estimates can be made regarding the probability of showing high AMA considering EI, ASE, and PATs scores.

The findings allow us to make a correct estimate for attention to feelings in 58.7% of cases ($\chi^2 = 11.24$; $p = 0.001$). These data allow us to affirm that this dimension of EI is a predictor of high AMA. The components of the model revealed by the odds ratio (OR) indicate that the probability of presenting high levels of AMA is greater, specifically 1.05 for each point increase in the attention to feelings factor of EI. Likewise, with respect to mood repair, the data allow us to make a correct estimate for 61.2% of cases ($\chi^2 = 11.82$; $p = 0.001$), indicating that this EI factor is also a predictor of AMA. The components of the model showing the odds ratio (OR) indicate that the probability of having high levels of AMA is 1.06 greater for each point that mood repair increases. Regarding clarity of feelings, the results found allow us to make a correct estimate in 61% of cases ($\chi^2 = 9.87$; $p = 0.002$), suggesting that this dimension of the TMMS-24 is a predictor of a high level of AMA. The components of the model showing the odds ratio (OR) indicate that the probability of presenting a high AMA is 1.05 higher for each point increase in clarity of feelings.

On the other hand, with respect to the variable of ASE, the data allow for a correct estimation in 58.7% of cases ($\chi^2 = 13.70$; $p = <0.001$), indicating that ASE is a predictor of high levels of AMA. In this case, the components of the model that show the odds ratio (OR) indicate that the probability of showing a high level of AMA is 1.06 higher for each point that ASE increases.

Finally, regarding PATs, the data concerning perfectionistic concerns offer a correct estimate in 60.4% of cases ($\chi^2 = 14.37$; $p = <0.001$), suggesting that this dimension of PATs is predictive of high AMA. The components of the model showing the odds ratio (OR) highlight that the probability of presenting high AMA is 1.07 higher for each point that perfectionistic concerns

TABLE 2 | Binary logistic regression for the probability of presenting high scores in aesthetic musical awareness based on emotional intelligence, academic self-efficacy, and perfectionistic automatic thoughts.

Variable		χ^2	R^2	*B*	*E.T.*	Wald	*p*	*OR*	I.C. 95%
A_TMMS	Classified correc.: 58.7%	11.24	0.04	0.05	0.01	10.90	0.001	1.05	1.02–1.09
	Constant		−1.07		0.43	6.09	0.014	0.34	
M_TMMS	Classified correc.: 61.2%	11.82	0.05	0.06	0.01	11.01	0.001	1.06	1.03–1.09
	Constant		−0.92		0.44	5.83	0.025	0.40	
C_TMMS	Classified correc.: 61%	9.87	0.03	0.05	0.01	9.53	0.002	1.05	1.02–1.08
	Constant		−0.90		0.41	4.88	0.027	0.40	
ASE_ SPSASS	Classified correc.: 58.7%	13.70	0.04	0.05	0.01	13.00	< 0.001	1.06	1.03–1.09
	Constant		−1.51		0.51	8.52	0.004	0.22	
PC_PCI	Classified correc.: 60.4%	14.37	0.04	0.11	0.04	12.3	< 0.001	1.07	1.03–1.11
	Constant		−1.24		0.30	12.4	0.001	0.28	
PD_PCI	Classified correc.: 60.6%	16.48	0.05	0.14	0.03	15.6	< 0.001	1.15	1.07–1.23
	Constant		−1.63		0.50	10.5	0.001	0.19	
PS_PCI	Classified correc.: 59.6%	10.67	0.03	0.06	0.01	10.30	0.001	1.06	1.02–1.10
	Constant		−1.04		0.43	5.69	0.017	0.35	

Classified correc., classified correctly; A_TMMS, attention to feelings; M_TMMS, mood repair; C_TMMS, clarity of feelings; ASE_ SPSASS, academic self-efficacy; PC_PCI, perfectionistic concerns; PD_PCI, perfectionistic demands; PE_PCI, perfectionistic strivings.

increase. Similarly, with respect to perfectionistic demands, the results obtained allow for a correct estimation in 60.6% of the cases (χ^2 =16.48; p = <0.001), indicating that this factor of the PATs is a predictor of high levels of AMA. The components of the model showing the odds ratio (OR) indicate that the probability of presenting high levels of AMA is 1.15 higher for each point increase in perfectionistic demands. Likewise, in relation to perfectionistic strivings, a correct estimate can be made for 59.6% of cases (χ^2 =10.67; p = 0.001), suggesting that this factor of PATs is a predictor of high AMA. The components of the model showing the odds ratio (OR) indicate that the probability of having a high AMA is 1.06 higher for each point that perfectionistic strivings increase.

DISCUSSION

The findings of this study indicate statistically significant differences for all EI, ASE, and PATs factors when considering high and low AMA scores, showing higher scores in the group with high AMA in all cases. Similarly, it is observed that EI, ASE, and PATs are predictors of high AMA.

Regarding EI, the results show that the three EI factors, attention to feelings, mood repair, and clarity of feelings score higher in the group with a high AMA level compared to the profile with a low level of AMA. Likewise, all three dimensions of EI are predictors of high AMA. Therefore, all the hypotheses of the study are fulfilled.

Possessing high EI demonstrates a better perception and understanding of the emotional state the person is going through at a given moment (Salovey and Mayer, 1990; Mayer et al., 2000; Lorenzo-de Reizábal, 2019). Therefore, this ability to perceive emotions can also be determined by contexts in which music is the key to the altering of emotions. In other words, this means having the ability to perceive, understand, and regulate one's own emotions (these being the three factors of EI) whether from music or from any other context.

It is worth remembering that music has the ability to alter and amplify emotions (Chong-Leung and Cheung, 2020), while at the same time regulating them (Bisquerra, 2017; Londsdale, 2018; Saarikallio et al., 2018; Stewart et al., 2019). This leads to emotional well-being and greater awareness (Dingle et al., 2016), which implies achieving a greater AMA. Therefore, there is the possibility to develop EI from musical strategies.

Regarding ASE, it is the group with high AMA that scores higher compared to the group with low AMA. Similarly, the results indicate that the probability of showing a high level of AMA increases as ASE increases.

According to previous studies, musical listening has a significant effect on positive affect, mental effort, and academic performance; however, it does not have a significant effect on perceived self-efficacy (Lim and Bang, 2018). In other words, a positive mood is able to be generated, which has an impact on the quality of a task and requires less mental effort and time spent on the task, without having a belief about higher ability (Lesiuk, 2005; Lim and Bang, 2018). However, other studies caution that, more concretely, ASE is linked to higher academic performance due to an individual having a belief about their ability to achieve an academic goal (Honicke and Broadbent, 2016; Yokoyama, 2019). There is no previous research examining the link between AMA and ASE, however, this study shows that feeling that one is capable of tackling an academic task has an impact on being more aware of one's own emotions generated by music, or at least thinking that one has a greater awareness of it. ASE is positively and significantly related to basic psychological needs, being based on competence, autonomy, and affinity needs, which contributes to optimal emotional development (Zhen et al., 2017), that is, perception, understanding, and clarity of feelings. Therefore, while there are studies that affirm the positive link established between EI and academic performance (Nirmala-Wijekoon et al.,

2017) and even with quality of work-life, satisfaction, and work engagement (Karimi and Karimi, 2016), from this study, it can be stated that having the belief of greater academic ability allows one to be more aware of one's emotions, in this case musical ones. In other words, there is a greater chance of presenting more AMA.

Finally, in relation to the PATs, the group with a high level of AMA, vs. the group with low levels, scored higher in perfectionistic concerns, perfectionistic demands, and perfectionistic strivings. Furthermore, it is observed that the three PAT factors are also predictors of high AMA. In other words, the probability of high AMA increases as perfectionistic concerns, perfectionistic demands, and perfectionistic strivings increase.

In a recent study of PAT profiles of varying intensity, it was observed that the high PAT group scored higher in attention to feelings compared to the moderate and low PAT profiles. Moreover, understanding and clarity of feelings scored higher in the moderate PAT group followed by the high PAT profile (Aparicio-Flores et al., 2021). This may be due to the fact that the concern and demand to be perfect triggers a high degree of meticulousness with the purpose of achieving one's goals (Stoeber et al., 2009). This also causes a high level of alertness to one's own internal emotions. In other words, this leads to possessing greater attention to feelings, which generates greater understanding and emotion repair skills (Aparicio-Flores et al., 2021).

Despite there not being previous studies that determine a link between AMA and PATs, this study indicates that PATs, that is, perfectionistic concerns, perfectionistic demands, and perfectionistic strivings, all predict AMA. These findings may be due equally to the degree of meticulousness exhibited by individuals with PATs (Besharat and Kamali, 2016) that makes them alert to both their external and internal stimuli. On the one hand, perfectionistic concerns are worries about making mistakes. On the other hand, demands are based on the requirement for self-improvement to not only perform better but also to avoid possible negative situations. Likewise, efforts are defined by thoughts that are based on striving toward perfection (Stoeber et al., 2014; Esteve-Faubel et al., 2020). In other words, the three PAT factors, despite having their specific peculiarities, are governed by a continuous rumination toward reaching perfection or, on the contrary, toward not committing any imperfection. Besharat and Kamali (2016) stated that both PATs and ego control predicted meticulousness, which shows us that those with the presence of PATs need absolute control of their actions considering given the great psychological distress that they experience in the event of acting imperfectly or not performing in an impeccable way (Flett et al., 1998; Lyubomirsky et al., 2015). Hence, they are governed by meticulousness in all their internal and external actions, triggering greater EI (Aparicio-Flores et al., 2021), and consequently greater AMA.

Limitations and Future Research

Several limitations should be noted. Firstly, despite having a large sample of participants, the results are not generalizable to the entire adolescent population. Likewise, due to the high sample of Spanish participants, they may find different cultural connotations. However, according to Argstatter (2015), it should be that at the level of emotional classification by musical stimuli, culture has no influence. Considering that our study is driven by AMA and not by attention to feelings after musical listening, it is likely that culture does not have a significant influence. However, in order to be able to affirm this hypothesis, it would be of great benefit to carry out a similar study with a population of similar ages that belong to different cultures in order to examine whether differences exist according to culture.

Moreover, this study shows differences in EI, ASE, and PATs according to high and low AMA, as well as showing that EI, ASE, and PATs are predictor variables of high AMA in late adolescence. However, there are no studies examining whether these results can be generalized to child and adult populations. Therefore, future studies should replicate the analyses performed with different age samples.

Furthermore, this work may be limited due to the use of self-report scales. This could be solved by employing an evaluation that uses multiple sources and methods.

Practical Implications and Conclusions

Despite the aforementioned limitations, this is a novel study that contributes to the investigation of emotional, artistic, and academic aspects in the adolescent stage for several reasons. First, it is the first study to examine the differences in EI, ASE, and PATs according to high and low AMA, as well as examine whether these three variables predict high AMA. Secondly, the observed results provide specific insights into the emotional aspects of adolescents that may have a positive impact on their psychological well-being and academic performance. In other words, this direct link between these variables may be suggesting, as McGinnis (2017) stated, that teachers should orient their pedagogical perspective toward musical experiences that help the development of students' emotional self-regulation.

It is worth remembering that adolescence is framed as a stage in which very intense emotions are experienced, but also is one in which the skills to regulate them are not yet fully developed (Dingle et al., 2016). Music can have a positive influence in this, especially at this stage (Ciarrochi et al., 2011).

Music enhances both positive and negative emotions (Chong-Leung and Cheung, 2020), and being aware of the emotions it conveys can bring both internal and external benefits (Karimi, 2021). As such, it is important to include musical training in people's daily lives to consciously influence their psychological improvement and well-being (Lieberman et al., 2011; Chong-Leung and Cheung, 2020), which in turn will influence their academic performance (Lim and Bang, 2018) and quality of life (Boden et al., 2015).

For music to have special relevance in emotional education, further teacher training is urged both in the identification and regulation of emotions through musical listening, as well as in the management of specific music that allows working in the classroom depending on the situation and the feeling to be increased and/or analyzed (Lorenzo-de Reizábal, 2019).

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author/s.

ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

RE-F and MA-F: article conceptualization, investigation, writing original draft, and review and editing. VC-N: formal analysis, data curation, and supervision. JE-F: methodology, formal analysis, resources, data curation, supervision and project administration. All authors have read and agreed to the published version of the manuscript.

REFERENCES

Agina, A. M., Kommers, P. A., and Steehouter, F. (2011). The effect of the external regulator's absence on children's speech use, manifested self-regulation, and task performance during learning tasks. *Comput. Hum. Behav.* 27, 1118–1128. doi: 10.1016/j.chb.2010.10.007

Aparicio-Flores, M. P., Esteve-Faubel, J. M., Esteve-Faubel, R. P., and Álvarez-Teruel, J. D. (2020b). High academic self-efficacy and dispositional empathy in future teachers. *Sustainability* 12, 6728–6744. doi: 10.3390/su12176728

Aparicio-Flores, M. P., Esteve-Faubel, J. M., Vicent, M., Gonzálvez, C., Sanmartín, R., and García-Fernández, J. M. (2021). Dispositional empathy and emotional intelligence in terms of perfectionistic automatic thoughts. *Span. J. Psychol.* 24, 1–10. doi: 10.1017/SJP.2020.57

Aparicio-Flores, M. P., Vicent, M., Sanmartín, R., Gonzálvez, C., Freire-Andino, R. O., and García-Fernández, J. M. (2020c). Psychometric properties of the perfectionism cognitions inventory in Ecuador. *Int. J. Environ. Res. Public Health* 17, 1–12. doi: 10.3390/ijerph17165834

Aparicio-Flores, M. P., Vicent, M., Sanmartín, R., Pérez-García, M. A., Álvarez-Teruel, J. D., and García-Fernández, J. M. (2020a). Propiedades psicométricas de la Desire For Aesthetics Scale (VR) en población adulta española [Psychometric properties of the Desire For Aesthetics Scale (RV) in the spanish adult population]. *Revista Espacios* 41, 23–32.

Argstatter, H. (2015). Perception of basic emotions in music: culture-specific or multicultural? *Psychol. Music* 44, 674–690. doi: 10.1177/0305735615589214

Asghar-Hayat, A., and Shateri, K. (2019). The role of academic self-efficacy in improving student's metacognitive learning strategies. *J. Adv. Med. Edu. Prof.* 7, 205–212. doi: 10.30476/jamp.2019.81200

Aydin, G., and Yerin-Güneri, O. (2020). Exploring the role of psychological inflexibility, rumination, perfectionism cognitions, cognitive defusion, and self-forgiveness in cognitive test anxiety. *Curr. Psychol.* 1–10. doi: 10.1007/s12144-020-00805-1

Besharat, M. A., and Kamali, Z. S. (2016). Predicting obsessions and compulsions according to superego and ego characteristics: a comparison between scrupulosity and non-religious obsessive-compulsive symptoms. *Asian J. Psychiatry* 19, 73–78. doi: 10.1016/j.ajp.2016.01.003

Bisquerra, R. (2017). Música y educación emocional. *Eufonía Didáctica de la música* 71, 43–48.

Boden, M. T., Irons, J. G., Feldner, M. T., Bujarski, S., and Bonn-Miller, M. O. (2015). An investigation of relations among quality of life and individual facets of emotional awareness and mindfulness. *Mindfulness* 6, 700–707. doi: 10.1007/s12671-014-0308-0

Brattico, E., Bogert, B., Alluri, V., Tervaniemi, M., Eerola, T., and Jacobsen, T. (2016). It's sad but i like it: the neural dissociation between musical emotions and liking in experts and laypersons. *Front. Hum. Neurosci.* 9, 2–21. doi: 10.3389/fnhum.2015.00676

Bucich, M., and MacCann, C. (2019). Emotional intelligence and day-to-day emotion regulation processes: examining motives for social sharing. *Pers. Individ. Dif.* 137, 22–26. doi: 10.1016/j.paid.2018.08.002

Bucura, E. (2019). Fostering self-efficacy among adolescents in secondary general music. *Gen. Music Today* 32, 5–12. doi: 10.1177/1048371319834080

Campbell, P. S., Connell, C., and Beegle, A. (2007). Adolescents' expressed meanings of music in and out of school. *J. Res. Music Edu.* 55, 220–236. doi: 10.1177/002242940705500304

Can, Y., and Güven, M. (2020). The effects of music on achievement emotions and self-efficacy beliefs of students who have different learning styles. *Sci. Edu. Art. Technol. J.* 4, 95–113.

Cassidy, S. (2015). Resilience building in students: the role of academic self-efficacy. *Front. Psychol.* 6, 1–14. doi: 10.3389/fpsyg.2015.01781

Chong-Leung, M., and Cheung, R. Y. M. (2020). Music engagement and well-being in Chinese adolescents: emotional awareness, positive emotions, and negative emotions as mediating processes. *Psychol. Music* 48, 105–119. doi: 10.1177/0305735618786421

Ciarrochi, J., Kashdan, T. B., Leeson, P., Heaven, P., and Jordan, C. (2011). On being aware and accepting: a one-year longitudinal study into adolescent well-being. *J. Adolesc.* 34, 695–703. doi: 10.1016/j.adolescence.2010.09.003

Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences*. New York, NY: Erlbaum.

Commodari, E., and Sole, J. (2019). Music education in junior high school: perception of emotions conveyed by music and mental imagery in students who attend the standard or musical curriculum. *Psychol. Music* 48, 824–835. doi: 10.1177/0305735619832962

Cores-Bilbao, E., Fernández-Corbacho, A., Machancoses, F. H., and Fonseca-Mora, M. C. (2019). A music-mediated language learning experience: student's awareness of their socio-emotional skills. *Front. Psychol.* 10, 1–10. doi: 10.3389/fpsyg.2019.02238

Desnoyers, A., and Arpin-Cribbie, C. A. (2015). Examining cognitive performance: do perfectionism and rumination matter? *Pers. Indiv. Dif.* 76, 94–98. doi: 10.1016/j.paid.2014.11.050

Dingle, G. A., Hodges, J., and Kunde, A. (2016). Tuned in emotion regulation program using music listening: effectiveness for adolescents in educational settings. *Front. Psychol.* 7, 1–10. doi: 10.3389/fpsyg.2016.00859

Ehrlich, S., Agres, K. R., Guan, C., and Cheng, G. (2019). A closed-loop, music-based brain-computer interface for emotion mediation. *PLoS ONE* 14, 1–24. doi: 10.1371/journal.pone.0213516

Esteve-Faubel, J. M., Aparicio-Flores, M. P., Vicent, M., Gonzálvez, C., Sanmartín, R., and García-Fernández, J. M. (2020). Validation of Spanish version of the perfectionism cognitions Inventory: profiles of automatic perfectionism thoughts and their association with social anxiety. *Prof. Psychol. Res. Pr.* 51, 268–277. doi: 10.1037/pro0000290

Fernández-Berrocal, P., Extremera, N., and Ramos, N. (2004). Validity and reliability of the Spanish modified version of the trait meta-mood scale. *Psychol. Rep.* 94, 751–755. doi: 10.2466/pr0.94.3.751-755

Fernández-Rio, J., Cecchini, J. A., Méndez-Giménez, A., Méndez-Alonso, D., and Prieto, J. A. (2017). Self-regulation, cooperative learning, and academic self-efficacy: interactions to prevent school failure. *Front. Psychol.* 8, 1–10. doi: 10.3389/fpsyg.2017.00022

Flett, G. L., Hewitt, P. L., Blankstein, K. R., and Gray, L. (1998). Psychological distress and the frequency of perfectionistic thinking. *J. Pers. Soc. Psychol.* 75, 1363–1381. doi: 10.1037/0022-3514.75.5.1363

Flett, G. L., Molnar, D. S., Nepon, T., and Hewitt, P. L. (2012). A mediational model of perfectionistic automatic thoughts and psychosomatic symptoms: the roles of negative affect and daily hassles. *Pers. Individ. Dif.* 52, 565–570. doi: 10.1016/j.paid.2011.09.010

Flett, G. L., Nepon, T., Hewitt, P. L., and Fitzgerald, K. (2016). Perfectionism, components of stress reactivity, and depressive symptoms. *J. Psychopatol. Behav. Assess.* 38, 645–654. doi: 10.1007/s10862-016-9554-x

Flett, G. L., Nepon, T., Hewitt, P. L., Zaki-Azat, J., Rose, A. L., and Swiderski, K. (2019). The mistake rumination scale: development, validation and utility of a measure of cognitive perfectionism. *J. Psychoedu. Assess.* 38, 84–98. doi: 10.1177/0734282919879538

Fritz, T. H., Schumde, P., Jentschke, S., Friederici, A. D., and Koelsch, S. (2013). From understanding to appreciating music cross-culturally. *PLoS ONE* 8, 1–6. doi: 10.1371/journal.pone.0072500

García-Fernández, J. M., Inglés, C. J., Torregrosa, M. S., Ruiz-Esteban, C., Díaz-Herrero, A., Pérez Fernández, E., et al. (2010). Propiedades psicométricas de la Escala de Autoeficacia Percibida Específica de Situaciones académicas en una muestra de estudiantes españoles de Educación Secundaria Obligatoria. *Eur. J. Edu. Psychol.* 3, 61–74. doi: 10.30552/ejep.v3i1.51

García-Fernández, J. M., Inglés, C. J., Vicent, M., Gonzálvez, C., Pérez-Sánchez, A. M., and Lagos-San Martín, N. (2016b). Validación de la escala de Autoeficacia Percibida Específica de Situaciones Académicas en Chile y su relación con las estrategias de aprendizaje [Validation of the Academic Situations Specific Perceived Self-efficacy Scale in Chile and its relation with learning strategies]. *Revista Iberoamericana de Diagnóstico y Evaluación- e Avaliação Psicológica* 41, 118–131.

García-Fernández, J. M., Inglés-Saura, C. J., Vicent, M., Gonzálvez, C., Lagos-San Martín, N., and Pérez-Sánchez, A. M. (2016a). Relación entre autoeficacia y autoatribuciones académicas en estudiantes chilenos [Relationship between self-efficacy and academic self-attributions in Chilean students]. *Universitas Psychologica* 15, 15–24. doi: 10.11144/Javeriana.upsy15-1.raaa

Getz, L. M., Chamorro-Premuzic, T., Roy, M. M., and Devroop, K. (2012). The relationship between affect, uses of music, and music preferences in a sample of South African adolescents. *Psychol. Music* 40, 164–178. doi: 10.1177/0305735610381818

Getz, L. M., Marks, S., and Roy, M. (2014). The influence of stress, optimism, and music training on music uses and preferences. *Psychol. Music* 42, 71–85. doi: 10.1177/0305735612456727

Hasanuddin, R., and Sjahruddin, H. (2017). The structure of emotional intelligence, spiritual intelligence and its relationship with work enthusiasm and auditor performance. *World J. Bus. Manage.* 3, 67–85. doi: 10.5296/wjbm.v3i1.11321

Honicke, T., and Broadbent, J. (2016). The influence of academic self-efficacy on academic performance: a systematic review. *Edu. Res. Rev.* 17, 63–84. doi: 10.1016/j.edurev.2015.11.002

Hunter, P. G., and Schellenberg, E. G. (2010). "Music and emotion," in *Music Perception*, eds En M.R. Jones, R.Fay, y A.Pooper (New York, NY: Springer handbook of auditory research), 129–163. doi: 10.1007/978-1-4419-6114-3_5

Karimi, M. (2021). A review of emotions makes up the bulk of life. *Int. J. Adv. Stud. Hum. Soc. Sci.* 10, 156–160. doi: 10.22034/IJASHSS.2021.278791.1050

Karimi, Z., and Karimi, F. (2016). The structural models of relationship between spiritual intelligence and emotional intelligence with quality of work life and work engagement of employees. *Int. J. Manage. Edu.* 10, 278–292. doi: 10.1504/IJMIE.2016.077508

Kawakami, A., Furukawa, K., Katahira, K., and Okanoya, K. (2013). Sad music induces pleasant emotion. *Front. Psychol.* 4, 1–15. doi: 10.3389/fpsyg.2013.00311

Kenny, D. T. (2011). *The Psychology of Music Performance Anxiety*. Oxford: Oxford University Presss. doi: 10.1093/acprof:oso/9780199586141.001.0001

Kirtley, O. J., O'Connor, R. C., and O'Carroll, R. E. (2015). Hurting inside and out? emotional and physical pain in self-harm ideation and enactment. *Int. J. Cogn. Ther.* 8, 156–171. doi: 10.1521/ijct.2015.8.2.156

Koelsch, S. (2014). Brain correlates of music-evoked emotions. *Nat. Rev. Neurosci.* 15, 170–180. doi: 10.1038/nrn3666

Koelsch, S. (2018). Investigating the neural encoding of emotion with music. *Neuron* 98, 1075–1079. doi: 10.1016/j.neuron.2018.04.029

Koelsch, S. (2020). A coordinate-based meta-analysis of music-evoked emotions. *NeuroImage* 223:117350. doi: 10.1016/j.neuroimage.2020.117350

Koelsch, S., and Skouras, S. (2014). Functional centrality of amygdala, striatum and hypothalamus in a "small-world" network underlying joy: an fMRI study with music. *Hum. Brain Mapp.* 35, 3485–3498. doi: 10.1002/hbm.22416

Kragness, H. E., and Trainor, L. J. (2019). Nonmusicians express emotions in musical productions using conventional cues. *Music Sci.* 2, 1–13. doi: 10.1177/2059204319834943

Lesiuk, T. (2005). The effect of music on work performance. *Psychol. Music* 33, 173–191. doi: 10.1177/0305735605050650

Lieberman, M. D., Inagaki, T. K., Tabibnia, G., and Crockett, M. J. (2011). Subjective responses to emotional stimuli during labeling, reappraisal, and distraction. *Emotion* 11, 468–480. doi: 10.1037/a0023503

Lim, H. A., and Bang, E. (2018). The effects of music listening on affect, self-efficacy, mental exertion, and task performance of online learners. *J. Scholarsh. Teach. Learn. Christians High. Edu.* 8, 13–37. doi: 10.31380/sotlched.8.1.13

Londsdale, A. J. (2018). Emotional intelligence, alexithymia, stress, and people's reasons for listening to music. *Psychol. Music* 47, 680–693. doi: 10.1177/0305735618778126

Londsdale, A. J., and North, A. C. (2011). Why do we listen to music? a uses and gratifications analysis. *Br. J. Psychol.* 102, 108–134. doi: 10.1348/000712610X506831

Lorenzo-de Reizábal, A. (2019). Música para el desarrollo de la conciencia emocional [Music for the development of emotional awareness]. *Publicaciones* 49, 191–213. doi: 10.30827/publicaciones.v49i2.8384

Lundy, D. E., Schenkel, M. B., Akrie, T. N., and Walker, A. M. (2010). How important is beauty to you? the development of the desire for aesthetics scale. *Empir. Stud. Arts* 28, 73–92. doi: 10.2190/EM.28.1.e

Lyubomirsky, S., Layous, K., Chancellor, J., and Nelson, K. S. (2015). Thinking about rumination: the scholarly contributions and intellectual legacy of Susan Nolen-Hoeksema. *Ann. Rev. Clin. Psychol.* 11, 1–22. doi: 10.1146/annurev-clinpsy-032814-112733

Macedo, A., Marques, C., Quaresma, V., Soares, M. J., Amaral, A. P., Araújo, A. I., et al. (2017). Are perfectionism cognitions and cognitive emotion regulation strategies mediators between perfectionism and psychological distress? *Pers. Individ. Dif.* 119, 46–51. doi: 10.1016/j.paid.2017.06.032

Mayer, J. D., Salovey, P., and Caruso, D. R. (2000). "Models of emotional intelligence," in *Handbook of Intelligence, 2nd Edn*, ed En R.J. Sternberg (Cambridge: Cambridge University Press), 396–420. doi: 10.1017/CBO9780511807947.019

McGinnis, E. J. (2017). Developing the emotional intelligence of undergraduate music education majors: an exploratory study using bradberry and greave's (2009) emotional intelligence 2.0. *J. Music Teach. Edu.* 27, 1–12. doi: 10.1177/1057083717723919

Mohn, C., Argstatter, H., and Wilker, F. W. (2011). Perception of six basic emotions in music. *Psychol. Music* 39, 503–517. doi: 10.1177/0305735610378183

Nagelkerke, N. J. D. (1991). A note on a general definition of the coefficient of determination. *Biometrika* 78, 691–692. doi: 10.1093/biomet/78.3.691

Nikooyeh, E., Zarani, F., and Fathabadi, J. (2017). The mediating role of social skills and sensation seeking in the relationship between trait emotional intelligence and school adjustment in adolescents. *J. Adolesc.* 59, 45–50. doi: 10.1016/j.adolescence.2017.05.012

Nirmala-Wijekoon, C., Amaratunge, H., De Silva, Y., Senanayake, S., Jayawardane, P., and Senarath, U. (2017). Emotional intelligence and academic performance of medical undergraduates: a cross-sectional study in a selected university in Sri Lanka. *BMC Med. Edu.* 17, 1–11. doi: 10.1186/s12909-017-1018-9

Palenzuela, D. (1983). Construcción y validación de una escala de autoeficacia percibida específica de situaciones académicas. *Análisis y Modificación de Conducta* 9, 185–219. doi: 10.33776/amc.v9i21.1649

Ross, M., Perkins, H., and Bodey, K. (2016). Academic motivation and information literacy self-efficacy: the importance of a simple desire to know. *Libr. Infor. Sci. Res.* 38, 2–9. doi: 10.1016/j.lisr.2016.01.002

Saarikallio, S. H., Maksimainen, J. P., and Randall, W. M. (2018). Relaxed and connected: insights into the emotional-motivational constituents of musical pleasure. *Psychol. Music* 47, 644–662. doi: 10.1177/0305735618778768

Salovey, P., and Mayer, J. D. (1990). Emotional intelligence. *Imag. Cogn. Personal.* 9, 185–211. doi: 10.2190/DUGG-P24E-52WK-6CDG

Sarikaya, M., and Kurtaslan, Z. (2018). Prediction of musical performance anxiety according to music teacher candidates' perfectionism and self-efficacy beliefs. *Int. Online J. Edu. Sci.* 10, 183–198. doi: 10.15345/iojes.2018.04.010

Schubert, E. (2013). Emotion felt by the listener and expressed by the music: literature review and theoretical perspectives. *Front. Psychol.* 4, 1–18. doi: 10.3389/fpsyg.2013.00837

Smith, M. M., Sherry, S. B., Ge, S. Y., Hewitt, P. L., Flett, G. L., and Lee-Baggley, D. (2021). Multidimensional perfectionism turns 30: a review of know knowns and known unknowns. *Can. Psychol.* doi: 10.1037/cap0000288. [Epub ahead of print].

Stewart, J., Garrido, S., Hense, C., and McFerran, K. (2019). Music use for mood regulation: self-awareness and conscious listening choices in young people with tendencias to depression. *Front. Psychol.* 10, 1–12. doi: 10.3389/fpsyg.2019.01199

Stoeber, J., Kobori, O., and Brown, A. (2014). Examining mutual supression effects in the assessment of perfectionism cognitions: evidence supporting multidimensional assessment. *Assessment* 21, 647–660. doi: 10.1177/1073191114534884

Stoeber, J., Otto, K., and Dalbert, C. (2009). Perfectionism and the Big Five: conscientiousness predicts longitudinal increases in self-oriented perfectionism. *Pers. Individ. Dif.* 47, 363–368. doi: 10.1016/j.paid.2009.04.004

Tyler, J., Mu, W., McCann, J., Belli, F., and Asnaani, A. (2021). The unique contribution of perfectionistic cognitions to anxiety disorder symptoms in a treatment-seeking sample. *Cogn. Behav. Ther.* 50, 121–137. doi: 10.1080/16506073.2020.1798497

Varner, E. (2019). General music learning is also social and emotional learning. *Gen. Music Today* 33, 74–78. doi: 10.1177/1048371319891421

Yokoyama, S. (2019). Academic self-efficacy and academic performance in online learning: a mini review. *Front. Psychol.* 9, 1–4. doi: 10.3389/fpsyg.2018.02794

Zhen, R., Liu, R. D., Ding, Y., Wang, J., Liu, Y., and Xu, L. (2017). The mediating roles of academic self-efficacy and academic emotions in the relation between basic psychological needs satisfaction and learning engagement among Chinese adolescent students. *Learn. Indiv. Dif.* 54, 210–216. doi: 10.1016/j.lindif.2017.01.017

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School Functioning and Educational Aspirations in Adolescents With Social Anxiety—The Young-HUNT3 Study, Norway

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Social anxiety disorder (SAD) typically emerges during childhood or early adolescence and often has long-term effects on several areas of an individual's life, including school and education. The purpose of this study is to examine whether social anxiety is associated with (1) school functioning in terms of behavioral difficulties (hyperactivity and/or attention problems), school dissatisfaction, social exclusion, truancy, and learning difficulties, and (2) educational aspirations (educational level). We use data from the population-based Young-HUNT3 study (2006–2008), where 8,199 Norwegian adolescents participated. Social anxiety is measured both as self-report [the Social Phobia and Anxiety Inventory for Children (SPAI-C)], and as screening information from diagnostic interviews [Anxiety Disorder Interview Schedule for DSM IV: child version (ADIS-C)]. ADIS-C screening positives (n = 388) reported higher rates of behavioral difficulties (RR = 1.06), school dissatisfaction (RR = 1.15), social exclusion (RR = 1.24), truancy (RR = 1.05), and learning difficulties (RR = 1.10) compared to screened negatives. Self-reported social anxiety symptoms showed similar patterns. Further, higher mean scores of self-reported social anxiety symptoms and being ADIS-C screening positive were negatively associated with aspirations of higher education (OR = 0.92 and OR = 0.74, respectively). However, as regards to having aspirations for the future (aspirations of higher education and/or aspirations of vocational training), no associations were found. The results indicate that social anxiety in adolescence is related to unfavorable/poorer school functioning and lower tendency of aspirations of higher education, which may have consequences for future educational pathways and later work life.

Keywords: social anxiety disorder, SAD, adolescents, educational aspirations, school functioning, bullying, social exclusion, HUNT study

INTRODUCTION

Social anxiety disorder (SAD) is a common mental disorder across cultures (Stein et al., 2017) and associated with functional impairments affecting both social life and educational attainments (de Lijster et al., 2018; Vilaplana-Pérez et al., 2020). SAD is linked to academic underachievement, in terms of failing a grade in the last year of compulsory school (Vilaplana-Pérez et al., 2020), higher rates of school dropouts (Van Ameringen et al., 2003), and a lower tendency to enter higher education (Kessler, 2003; Vilaplana-Pérez et al., 2020). The negative association between SAD and educational attainment is of particular relevance because low educational level is linked to various unfavorable health outcomes (Krokstad et al., 2002; De Ridder et al., 2012; Myhr et al., 2018).

SAD and social anxiety symptoms at subclinical levels typically emerge during adolescence—a period in life when more time is spent on other arenas than family (Larson and Richards, 1991; Furman and Buhrmester, 1992) and school becomes more challenging, with increasing academic demands. Social anxiety can be measured as a diagnostic phenomenon or expressed along a symptom severity scale (Rapee and Spence, 2004). SAD and social anxiety symptoms are characterized by a marked, persistent fear of social and performance situations in which the individual is exposed to possible, or at least perceived, scrutiny by others (American Psychiatric Association, 2000). Since consistent exposure to social and performance situations is common in schools and especially feared among individuals with social anxiety (Hofmann et al., 1999; Gren-Landell et al., 2009), day-to-day-school life might be especially anxiety-provoking (Mychailyszyn et al., 2010). In a study of Swedish adolescents aged 12–14 yr with self-reported SAD, more than 90% reported impairment in school activities due to their symptoms (Gren-Landell et al., 2009). A Finnish study of 12–17-yr-olds reported lower grade point averages among those with social anxiety and subthreshold symptoms than their healthy peers (Ranta et al., 2009). Finally, a 2-yr longitudinal study of Finnish adolescents aged 15–17 yr using a self-report instrument with a diagnostic cutoff found that SAD predicted slower academic progress among boys but not girls (Ranta et al., 2016).

School functioning includes several arenas and school-related impairment can be linked to academic achievement, as well as social, emotional, and behavioral aspects of the school climate (Mychailyszyn et al., 2010). In a US study of children aged 7–14 yr, individuals with SAD were rated as performing worse academically and being less happy than individuals without a diagnosis (Mychailyszyn et al., 2010). Further, in a non-clinical sample of 45 elementary school children with SAD, Bernstein et al. (2008) reported that condition severity was associated with reduced classroom functioning, such as a greater tendency to experience learning and attention problems and to exhibit poor social and leadership skills. It follows that social anxiety appears to impact several areas of school functioning.

Adolescents' school functioning is closely connected to how they see and plan their future (OECD, 2017; Gutman and Schoon, 2018). Planning an educational career is often rooted in educational aspirations and motivation and ideas of what educational level a person wants to complete. Educational aspirations are strong predictors for achievement in school and later educational attainment (Beal and Crockett, 2010; Rothon et al., 2011; Khattab, 2015). Previous population-based adolescent studies have reported an association between health impairments, psychical and mental health problems, and low educational aspirations (Stevens et al., 1996; Bania et al., 2015; Dobewall et al., 2019). These findings indicate that health challenges represent obstacles to visualizing future potential. In a study of Finnish 12–15-yr-old adolescents, those with good self-rated health were more likely to apply for an academic track. In contrast, those reporting average or poor health were more likely to apply for a vocational track (Dobewall et al., 2019). In the Norwegian Arctic Adolescent Health Study, Bania et al. (2015) reported more intermediate rather than higher-level educational aspirations among adolescents suffering from emotional problems. A Swedish longitudinal study demonstrated that adolescents who reported high academic aspirations had a lower risk of mental health problems 1 yr after, seemingly adding further support for the linkage between health and aspirations (Almroth et al., 2018).

The aim of this study is to investigate whether social anxiety (categorized as self-reported symptoms, being screening positive for SAD or meeting the diagnostic criteria for SAD in a diagnostic interview) is associated with (1) adolescent school functioning, in terms of (a) behavioral difficulties/attention problems, (b) school dissatisfaction, (c) experience of social exclusion, (d) truancy, and (e) learning difficulties, and (2) educational aspirations. We use population data from the social anxiety sub-study in Young-HUNT3 (2006–2008), which consists of both self-reported social anxiety symptoms; the Social Phobia and Anxiety Inventory for Children (SPAI-C), (Beidel et al., 1995), as well as screening information from diagnostic interviews: Anxiety Disorder Interview Schedule for DSM IV: child version (ADIS-C), (Rasmussen and Neumer, 2015).

METHODS

Sampling and Procedure

This study is based on data from the Young-HUNT3 study (2006–2008), the adolescent part of the third Trøndelag Health Study (HUNT), (Holmen et al., 2013). HUNT study is a cross-sectional population-based health survey conducted in Trøndelag county, Norway, and is one of the world's largest health surveys (Holmen et al., 2003). Further information on HUNT and Young-HUNT study is available elsewhere (Holmen et al., 2003, 2013; Krokstad et al., 2012).

In Young-HUNT3, all adolescents 13–19 yr living in the former Nord Trøndelag county of Norway at the time of the study period, a total of 10,464 adolescents, were invited to participate. The survey consisted of a self-report questionnaire, physical examinations, and clinical interviews. The self-report questionnaire was completed during school hours, whereas the examinations and interviews were carried out ∼1 month after. Students absent from school were offered to complete the questionnaire on the interview day, whereas students not attending the interview received the survey by mail (Holmen

et al., 2013). A total of 8,199 adolescents (response rate 78.4%) completed the questionnaire, of which 6,610 participated in the social anxiety sub-study (Jystad et al., 2021). See Figure 1 in Jystad et al. (2021) for further details regarding the sampling process.

Measurements

Questionnaire (n = 8,199)

Descriptive Variables

Participants were categorized into two *age groups*: 13–15 yr, representing students in lower secondary school, and ≥ 16 yr, representing students in upper secondary school.

Family economic status was measured with an item asking whether the adolescent ranged his or her family economic status as worse, better, or equal compared to others.

School functioning was measured with 16 items covering topics such as difficulties concentrating in class, appreciation with school participation, and bullying/being bullied, each item rated on an ordinal Likert-scale (1 = never, 2 = sometimes, 3 = often, and 4 = very often). These questions have previously been used to assess school functioning in Young-HUNT (De Ridder et al., 2013; Ranøyen et al., 2014). We wanted to investigate associations between being screening positive for SAD and symptoms of social anxiety, with different measures/patterns of school functioning, and used principal component analysis (PCA) with varimax rotation to identify relevant indices to be used in further analysis. We found that 14 of the 16 items had sufficient factor loadings to cover three different factors; six items covering "behavioral difficulties and/or attention problems" ($\alpha = 0.74$), related to the ability to pay attention and sit calm during classes; six covering "School enjoyment" ($\alpha = 0.73$) related to enjoyment in curricular activities; and finally, two items covering "Social exclusion" ($\alpha = 0.68$), regarding name-calling, and being excluded by peers. In addition, the two remaining items, "truancy" (unexcused school absenteeism) and "learning difficulties" (currently receiving help for learning difficulties), were included in the analyses as single items. The six variables included in "school enjoyment" were reversed in order to look at the association between social anxiety and "school dissatisfaction" (i.e., the lack of school enjoyment).

For the descriptive analyses, a mean score across the items in each factor was computed, a higher score indicating more school functioning problems. For the robust multiple Poisson regression analyses, a sum score for each factor was computed, generating a range of 6–24 for "behavioral difficulties/attention problems" and "school dissatisfaction," 2–8 for "social exclusion," and 1–4 for "truancy" and "learning difficulties."

Academic aspirations were assessed by the item "What plans do you have regarding continued studies?" and rated on an ordinal scale *"college or university for 4 yr or more," "college or university <4 yr," "other vocational training," "no plans"* and *"don't know,"* allowing for multiple answers. For the descriptive analyses we collapsed it into three categories: the first two were merged to "college or university," the second was those who reported "other vocational training," whereas the third category consisted of those who answered "no plans" and "don't know" combined to one: "no plans/don't know." Furthermore, a hierarchy of the variables was made in such a way that the "highest" alternative became the valid one when multiple answers were given:

1. College or university (highest)
2. Vocational training
3. No plans/don't know (lowest)

For the multiple logistic regression analyses, we created two dichotomous variables; the first one consisting of 1 = those who had answered "college or university" vs. 0 = those who had *not* answered college or university (as a measure of having plans of higher education); the second consisting of 1 = those who had answered college, university and/or vocational training and 0 = those who had answered only no plans/don't know (as a measure of whether or not having plans for the future).

Self-Reported Social Anxiety Symptoms: SPAI-C

The questionnaire included a shortened, six-item version of the original 26-item version of the Social Phobia and Anxiety Inventory for Children (SPAI-C; Beidel et al., 1995), measuring self-reported social anxiety symptoms. SPAI-C is originally a DSM-IV-based self-report measure (Beidel et al., 1995), which has shown satisfying psychometric properties for use among adolescents (Storch et al., 2004). The Norwegian version was translated by Aune and and Hjemdal (2017), and the six items included in Young-HUNT were chosen based on factor analysis (Ranøyen et al., 2014). The items were all rated on a 5-point Likert scale, ranging from 1 = never to 5 = always. A mean SPAI-C score (Cronbach's alpha = 0.84) was calculated; higher mean scores indicating higher levels of symptoms.

Anxiety and Depression Symptoms (SCL-5)

To assess general symptoms of anxiety and depression during the past 2 weeks, a shortened five-item-version of the original 25-item Symptom Check List (SCL), (Derogatis et al., 1974), was used. Each item had four response options, from 1 = not bothered to 4 = very bothered. The five-item version (SCL-5) has shown adequate reliability and validity (Strand et al., 2003). A mean SCL-score was calculated across the five items (Cronbach's alpha = 0.83), with higher mean scores indicating higher symptom levels.

SAD Screening/Anxiety Disorders Interview Schedule for DSM IV: Children's Version (n = 6,610)

In addition to self-report information from the questionnaire, Young-HUNT3 included a social anxiety sub-study using the Anxiety Disorders Interview Schedule for DSM IV: Child Version (ADIS-C). ADIS-C is a diagnostic interview based on the DSM-IV criteria used to diagnose anxiety disorders and other mental disorders among children and adolescents (Rasmussen and Neumer, 2015). The social anxiety sub-study included an initial screening phase involving three items from the social anxiety part of ADIS-C and a complete diagnostic ADIS-C interview of the screening positive adolescents. Two municipalities did not participate in this part of Young-HUNT3, which resulted in the exclusion of $n = 1,589$ participants. Of the remaining $n = 6,610$ participating adolescents, a total of $n = 388$ (5.9%) answered yes to at least one of the questions and were considered as screening

positive (SP). Adolescents who answered no to all three questions ($n = 6{,}222$) were considered as screening negative (SN), (Jystad et al., 2021). Further details regarding the social anxiety sub-study are available in Jystad et al. (2021).

Groups

In the statistical analyses, the study sample was divided into the following subgroups:

1. ADIS-C SN ($n = 6{,}222$; answered no to all three screening questions)
2. ADIS-C SP ($n = 388$; answered yes to one or more SAD screening questions)

As a part of the social anxiety sub-study in Young-HUNT3, the adolescents who screened positive were invited to a complete diagnostic ADIS-C interview performed by specially trained nurses. A total of $n = 212$ (response rate 54.6%) participated, of which a SAD diagnose was indicated in $n = 106$ (50% of the interview objects), which generated the following three SP subgroups:

a. ADIS-C SP, SAD confirmed by ADIS-C interview ($n = 106$) (SAD)
b. ADIS-C SP, SAD not confirmed by ADIS-C interview with trained nurses ($n = 106$) (SPNOSAD)
c. ADIS-C SP that did not attend the interview ($n = 176$) (NMI).

Statistics

Stata version 15.1 (StataCorp, 2017) was used for data management and statistical analyses.

First, a descriptive analysis was performed for the study groups with respect to mean scores for the three factors of school functioning (behavioral difficulties and/or attention problems, school dissatisfaction, and social exclusion) as well as the two single items (learning problems and truancy/school absenteeism), for educational aspirations, and for the additional descriptive variables: sex, age groups, age mean, age distribution, family economic status, self-reported social anxiety symptoms (mean score SPAI-C), general anxiety and depression symptoms (mean score SCL-5).

Second, in multiple Poisson regression analysis, requesting robust standard errors, associations were estimated between the SP group ($n = 388$) and five factors of school functioning: sum score of behavioral difficulties/attention problems, sum score of school dissatisfaction, and sum score of social exclusion using SN group as a reference. The same procedure was performed for the two single items of school functioning (learning difficulties and truancy). Further, the variables of school functioning were investigated using mean SPAI-C scores (continuous variable), ("SPAI-C score"), as predictor variables in the robust multiple Poisson regression model, involving the total sample who answered the self-report questionnaire ($n = 8{,}199$). The same was performed with a mean score of SCL-5 ("SCL-5 score") as the predictor ($n = 8{,}199$). The analyses for SPAI-C and SCL-5 as predictors were then repeated and performed separately for students in lower secondary school (13–15 yr of age) and upper secondary school ($\geq$ 16 yr of age). Results are reported as rate ratios (RR) along with 95% confidence intervals (95% CI).

Finally, multiple logistic regression analysis was performed to estimate the odds ratio (OR) for the association between the ADIS-C SP group and aspirations for further education, using the ADIS-C SN group as the reference group ($n = 6{,}610$). The same procedure was performed using mean scores of (1) SPAI-C and (2) SCL-5 as predictors, involving the total sample ($n = 8{,}199$). Results are reported as odds ratios (OR) with 95% confidence intervals (95% CI). All analyses were adjusted for sex, age (measured on a continuous scale), and perception of family economic status.

Analyses of the SP subgroups were also performed, the results are presented in **Supplementary Tables 1–3**.

Ethics

Participation in the Young-HUNT3 study was voluntary. Informed written consent was signed by the participants. For participants under the age of 16, signed permission from the parents was necessary (Holmen et al., 2013). The research protocol was approved by Regional Committees for Medical and Health Research Ethics (REK).

RESULTS

Descriptive Characteristics

Table 1 shows descriptive data for the study groups. A total of $n = 388$ adolescents were in the SP group – 267 (68.8%) girls and 121 (31.2%) boys. A total of $n = 6{,}222$ of the adolescents were in the SN group – 3,063 (49.2%) girls and 3,159 (50.8%) boys. The SP group reported higher mean scores for behavioral difficulties/attention problems (SP: 1.71, SN: 1.61), school dissatisfaction (SP: 2.46, SN: 2.12), social exclusion (SP: 1.53, SN: 1.24), truancy (SP: 1.35, SN: 1.25), and learning difficulties (SP: 1.37, SN: 1.27), compared to the SN group. The same tendencies were observed for the three SP subgroups within the SP group (see **Supplementary Table 1** in Supplementary). In addition, the SAD subgroup reported the highest mean score for social exclusion (1.64) (see **Supplementary Table 1** in Supplementary).

A lower proportion of the SP group reported aspirations of going to university compared to the SN group (SP: 34.1%, SN: 39.2%), and a higher proportion of the SP group answered no plans/don't know (SP: 45.8%, SN: 41.8%). This was also observed for the three SP subgroups (see **Supplementary Material**). Regarding age differences, a higher proportion of adolescents under the age of 16 answered no plans/don't know (48.6%) compared to adolescents over the age of 16 (35.4%). For remaining descriptive characteristics, see **Table 1**.

Social Anxiety and School Functioning

Table 2 shows associations expressed as RR between (1) ADIS-C SP group, (2) self-reported social anxiety symptoms on a continuous scale (SPAI-C), (3) self-reported mental distress (SCL-5), and the five indicators of school functioning (behavioral difficulties/attention problems, school dissatisfaction, social exclusion, truancy and learning difficulties). After adjusting for sex, age, and family economic status, the SP group reported a 24% higher rate of social exclusion compared to the SN group [RR:

TABLE 1 | Descriptive characteristics of adolescents in Young-HUNT3 categorized/identified as ADIS-C screening negative ($n = 6,222$) and ADIS-C screening positive ($n = 388$).

	SAD (ADIS-C) screening negatives	SAD (ADIS-C) screening positives
Sex *n* (%)		
Girls	3,063 (49.23)	267 (68.81)
Boys	3,159 (50.77)	121 (31.19)
Age mean (sd)	15.97 (1.70)	16.12 (1.90)
Age distribution *n* (%)		
13–15 yr	3,176 (51.04)	195 (50.26)
≥ 16 yr	3,046 (48.96)	193 (49.74)
Family economic status *n* (%)		
Worse	497 (8.46)	57 (15.92)
Equal	4,311 (73.42)	250 (69.83)
Better	1,064 (18.12)	51 (14.25)
Mean all social anxiety items (SPAI-C), (sd)	1.86 (0.01)	2.82 (0.05)
Mean anxiety and depression items (SCL-5) (sd)	1.47 (0.01)	2.01 (0.04)
Mean school functioning (sd)		
Behavioral difficulties/attention problems (1–4)	1.61 (0.01)	1.71 (0.02)
School dissatisfaction (1–4)	2.12 (0.01)	2.46 (0.03)
Social exclusion/bullying (1–4)	1.24 (0.01)	1.53 (0.04)
Truancy (single item) (1–4)	1.25 (0.01)	1.35 (0.03)
Learning difficulties (single item) (1–4)	1.27 (0.01)	1.37 (0.04)
Educational aspirations *n* (%)		
No plans/don't know	2,383 (41.79)	164 (45.81)
Vocational training	1,082 (18.97)	72 (20.11)
University	2,238 (39.24)	122 (34.08)

Missing values: for family economic status, values were missing for n = 380/5.7% of the 6,610 participants in social anxiety sub-study of Young-HUNT3, n = 30/7.7% of the 388 screening positives. Among the 6,610, missing values for SPAI-C ranged between n = 167/2.5%, and n = 187/2.8% across the six items. The summed mean score missed values for n = 261/3.9%, n = 19/4.9% of the 388 screening positives. Among the 6,610, missing values for SCL-5 ranged between n = 155/2.3%, and n = 165/2.5% across the six items. The summed mean score missed values for n = 209/3.2%, n = 16/4.1% of the 388 screening positives. Among the 6,610 participants, mean scores of behavioral difficulties/attention problems had missing values for n = 576 = /8.7%, and n = 40/10.3% of the 388 screening positives, mean scores of school dissatisfaction: n = 555/8.4% and n = 46/11.9%, and mean scores of social exclusion: n = 483/7.3% and n = 36/9.3%. For the single items, missing values were n = 420/6.4% and n = 33/8.5% (truancy), and n = 671/10.2% and n = 48/12.4% (learning difficulties). For educational aspirations, variables were missing for n = 549/8.3% of the 6,610 participants, n =30/7.7% of the 388 screening positives.

More detailed descriptions of the sample described in this table can be found in Jystad et al. (2021).

1.24, CI: (1.19–1.30)]. Similarly, compared to the SN group, the SP group reported higher rates of behavioral difficulties/attention problems [RR: 1.06, CI: (1.04–1.09)], school dissatisfaction [RR: 1.15, CI: (1.13–1.18)], truancy [RR: 1.05, CI: (1.01–1.10)], and learning difficulties [RR: 1.10, CI: (1.03–1.17)]. Similar directions of associations were observed for the SP subgroups (see **Supplementary Table 2**) and for social anxiety symptoms measured on a continuum (SPAI-C); a one-unit increase in the mean score of social anxiety symptoms was associated with an 8% increase in the rate of behavior difficulties/attention problems, a 9% increase in school dissatisfaction, a 15% increase in experience of social exclusion, a 6% increase in score of truancy, and a 5% increase in learning difficulties. Similar directions of associations were observed between SCL-5 and indicators of school functioning.

Social Anxiety and Educational Aspirations

Table 3 shows the associations expressed as ORs adjusted for sex, age, and perception of family economic status, between the (1) ADIS-C SP group, (2) self-reported social anxiety on a continuous scale and (3) self-reported mental distress, and aspirations of higher education (university). Being in the SP group ($n = 388$) was associated with a 26% reduction in odds of having aspirations of going to university/higher education. A lower tendency was also observed for the NMI subgroup but not for SPNOSAD and SAD subgroups (see **Supplementary Table 3**). No associations between the SP group and aspirations for the future were found.

Table 3 also shows associations, adjusted for sex, age, and perception of family economic status, between (1) self-reported social anxiety symptoms (SPAI-C) and (2) self-reported mental distress (SCL-5), both as continuous scores, and aspirations of higher education (university). For adolescents ≥ 16 yr of age, a one-unit increase in mean SPAI-C was associated with a 14% reduction in odds of having aspirations of the university. For adolescents <16 yr, no associations were found. For SCL-5, the case is the opposite; in the younger age group (<16 yr), a one-unit increase in mean SCL-5 score was associated with a 41% *increase* in odds for having aspirations of higher education. In contrast, no association was found for adolescents 16 yr or older.

DISCUSSION

This large population-based study of >6,000 Norwegian adolescents shows that social anxiety (measured by self-reported symptoms, ADIS-C screening questions and diagnosed by a complete ADIS-C interview based on DSM-IV criteria) was associated with lower school functioning as indicated by higher reports of behavioral difficulties/attention problems, school dissatisfaction, social exclusion, truancy and learning difficulties. Overall, results from our study lend further support to previous research indicating that individuals with social anxiety struggle to cope in the school situation (Davidson et al., 1993; Essau et al., 1999; Wittchen et al., 1999; Chartier et al., 2001; Bernstein et al., 2008; Ranta et al., 2009; Mychailyszyn et al., 2010; Ranøyen et al., 2014). Furthermore, among adolescents with social anxiety, we found lower tendency of aspirations of higher education, in particular among students attending upper secondary school. Our findings are comparable

TABLE 2 | Associations* between symptoms of SAD and mental distress and indicators of school functioning among adolescents.

	Behavioral difficulties/ attention problems Range: 6–24		Schooldissatisfaction Range: 6–24		Social exclusion/bullying Range: 2–8		Truancy Range: 1–4		Learning difficulties Range: 1–4	
	RR	**95% CI**	**RR**	**95% CI**	**RR**	**95% CI**	**RR**	**95% CI**	**RR**	**95% CI**
Screening status[a]	(*n* = 5,983)		(*n* = 6,003)		(*n* = 6,074)		(*n* = 6,131)		(*n* = 5,887)	
Screening ADIS-C negative	1 (reference)		1 (reference)		1 (reference)		1 (reference)		1 (reference)	
Screening ADIS-C positive	**1.06**	1.04–1.09	**1.15**	1.13–1.18	**1.24**	1.19–1.30	**1.05**	1.01–1.10	**1.10**	1.03–1.17
Self-report[b] *social anxiety symptoms*	(*n* = 7,116)		(*n* = 7,206)		(*n* = 7,276)		(*n* = 7,352)		(*n* = 7,062)	
SPAI-C score	**1.08**	1.07–1.09	**1.09**	1.08–1.10	**1.15**	1.13–1.16	**1.06**	1.04–1.07	**1.05**	1.03–1.07
Self-report[b] *mental distress*	(*n* = 7,189)		(*n* = 7,226)		(*n* = 7,302)		(*n* = 7,376)		(*n* = 7,079)	
SCL-5 score	**1.17**	1.16–1.19	**1.11**	1.10–1.13	**1.22**	1.19–1.24	**1.14**	1.12–1.16	1.01	0.99–1.04

Rate ratio (RR) and 95% confidence interval (95% CI).
Values where CI do not cross 1 are put in bold.
**Adjusted for sex, age and family economic status.*
[a]*Missing values for school functioning and adjustment variables among ADIS-C screening negatives (n = 6,222), and ADIS-C screening positives (n = 388): see* ***Table 1****.*
[b]*Missing values among the total of n = 8,199 participants answering self-report questionnaire in Young-HUNT3: sum scores of behavioral difficulties/attention problems had missing values for n = 834/10.2%, sum scores of school dissatisfaction for n = 794/9.7%, and sum scores of social exclusion for n = 707/8.6%. For the single items, missing values were n = 615/7.5/% (truancy), and n = 930/11.3% (learning difficulties). Missing values for family economic status were n = 563/6.9%.*

TABLE 3 | Associations between various degrees of social anxiety symptoms and mental distress, and aspirations of higher education and aspirations for the future.

	Aspirations of higher education		Aspirations for the future	
	Adjusted OR	**95% CI**	**Adjusted OR**	**95% CI**
*Screening status**	(*n* = 5,725)		(*n* = 5,725)	
Screening ADIS C neg	1 (reference)		1 (reference)	
Screening ADIS-C pos	**0.74**[a]	0.58–0.94	0.87[a]	0.69–1.09
*Self-report*** *social anxiety symptoms*	(*n* = 6,886)		(*n* = 6,886)	
SPAI-C score				
All	**0.92**[a]	0.85–0.99	0.95[a]	0.88–1.02
Age group <16 yr	1.01[b]	0.91–1.11	1.04[b]	0.94–1.14
Age group ≥ 16 yr	**0.86**[b]	0.77–0.95	**0.87**[b]	0.79–0.97
*Self-report*** *mental distress*	(*n* = 6,913)		(*n* = 6,913)	
SCL-5 score				
All	**1.18**[a]	1.08–1.30	**1.15**[a]	1.05–1.27
Age group <16 yr	**1.41**[b]	1.23–1.61	**1.39**[b]	1.22–1.59
Age group ≥ 16 yr	1.05[b]	0.92–1.20	0.99[b]	0.86–1.14

Odds ratio (OR) and 95% confidence interval (95% CI).
Values where CI do not cross 1 are put in bold.
[a]*Adjusted for sex, age and family economic status.*
[b]*Adjusted for sex, and family economic status.*
Missing values for educational aspirations and adjustment variables among ADIS-C screening negatives (n = 6,222) and ADIS-C screening positives (n = 388): see* ***Table 1**.*
***Missing values among the total of n = 8,199 participants answering self-report questionnaire in Young-HUNT3: educational aspirations had missing values for n = 653/8.0%. Missing values for family economic status were n = 563/6.9%.*

with previous studies reporting associations between poor mental health and low educational aspirations in general (Rothon et al., 2011; Bania et al., 2015; Dobewall et al., 2019).

School Functioning and Educational Aspirations

The association between social anxiety and increased risk of behavioral difficulties, attention problems, or both may reflect

that individuals with social anxiety struggle in the classroom situation, which requires students to be calm, concentrated, and pay attention to the teacher. This is in accordance with previous findings among students with social anxiety, both among adolescents (Davidson et al., 1993) and children (Bernstein et al., 2008; Van Roy et al., 2009). Higher mean scores of self-reported social anxiety symptoms (SPAI-C) were positively associated with behavioral difficulties/attention problems. A study based on parent and teacher information also found that severity of social anxiety was associated with greater attention problems (Bernstein et al., 2008). It is likely that attention problems are derived from distractions caused by the fear and anxiety they experience in the classroom situation (Bernstein et al., 2008).

Social anxiety was positively associated with school dissatisfaction. Although we studied a somewhat older cohort, this is comparable with findings from an American study of school functioning of children and adolescents, where pupils with SAD were rated as less happy compared to their healthy peers (Mychailyszyn et al., 2010). It is also in line with findings from a retrospective clinical study of 201 adults with anxiety disorders, where 90 of the patients (45%) reported not enjoying school when they were children (Van Ameringen et al., 2003). In a review regarding school absenteeism in youth, boredom and lack of interest in school were reported as important risk factors for school dropout (Kearney, 2008). However, in the study by Van Ameringen et al. (2003), the majority of the sample described typical symptoms of social anxiety—nervousness in the school situation and discomfort speaking in front of the class—as the main reasons for not enjoying and dropping out of school or both. This may indicate that lack of school enjoyment among students with social anxiety is linked to symptom burden in the school situation, rather than boredom.

Social anxiety was positively associated with social exclusion. Our results support previous evidence for the tendency of individuals with social anxiety to report having fewer friends (Erath et al., 2010), having trouble making new friends (Bernstein et al., 2008), as well as experiencing poor support from friends (La Greca and Lopez, 1998). In light of social exclusion being defined as one type of bullying (Smith et al., 2002), findings also support previous evidence of the link between social anxiety and peer victimization/bullying (Ranta et al., 2009; Gren-Landell et al., 2011; Acquah et al., 2016; de Lijster et al., 2018; Chiu et al., 2021). Our results are worrisome, considering that poor peer experiences have been linked to school dropout later on, adult adjustment problems (Parker and Asher, 1987), as well as an elevated risk for social anxiety symptoms later in life (Chiu et al., 2021).

Not surprisingly, social anxiety was also positively associated with truancy. Avoidance of situations generating anxiety is one of the main aspects of the condition. The principle of mandatory schooling, however, demands the pupil to participate in activities typically feared, and therefore, truancy may be the consequence (Ingul, 2014). A positive association between self-reported social anxiety symptoms and school absence has previously been reported among Norwegian adolescents (Ingul et al., 2012) whereas an association between truancy and screening questions was indicated in a German survey investigating school absenteeism among 1,359 high school students, where there was a higher percentage among those reporting non-attendance during the past 7 days that reported to feel anxiety or nervousness in unfamiliar situations, compared to the attendant students (35% vs. 22%), (Pflug and Schneider, 2016). In a clinical study of American children diagnosed with SAD, 10% reported that they regularly refused to attend school (Beidel et al., 1999), demonstrating that the link between social anxiety and school absence is present also among younger pupils. Finally, in Van Ameringen et al. (2003) study of 201 adults with anxiety disorders, 49% had dropped out of school, in which the majority suffered from SAD. In spite of our results and the literature linking social anxiety to school absences, it is important to keep in mind that the causes of school absences are various and influenced by a range of factors (Kearney, 2008). Lastly, it is worth mentioning that anxiety-based school absenteeism most usually is referred to as "school refusal" (Kearney, 2008). In contrast, the term "truancy" refers to unexcused, illegal, and problematic school absenteeism, which most often is used when speaking of school absence related to externalizing problems (Kearney and Silverman, 1996; Egger et al., 2003). However, the terms are used interchangeably. Our choice of using "truancy" is based on the Norwegian term "skulk" used in the questionnaire, which usually refers to an unexcused version of school absenteeism.

Our results revealed a weak association between social anxiety and the degree of learning difficulties. However, it is challenging to determine whether social anxiety leads to learning difficulties or if the case is the other way around (Ranøyen et al., 2014). A possible explanation could be that the constant fear of school-related social and performance activities in the classroom requires so much energy that the individual is hindered in focusing on learning. On the other hand, it is possible that having learning difficulties lead to fear of being scrutinized in the classroom. However, neither of these two causal directions are mutually exclusive.

Regarding educational aspirations, social anxiety was associated with lower odds of reporting aspirations of higher education. Considering that the main characteristics of SAD and social anxiety are fear and avoidance of social and performance situations (American Psychiatric Association, 2000), which are common in school and educational settings, a strategy of preventing future discomfort by not planning to attend higher education, is reasonable. Thus, the choice of career may be motivated by the hope of avoiding uncomfortable situations in adult life. In addition, it is worth reflecting upon the fact that social anxiety has been linked with negative self-imagery (Chapman et al., 2020), probably leading to less confidence in own abilities and aspirations matching only what is anticipated as manageable. To the best of our knowledge, there is a lack of previous studies of educational aspirations among adolescents with social anxiety, and therefore, exact comparisons of our results to other studies are challenging. However, compared to poor mental health in general, our findings are in accordance with Rothon et al. (2011) study of British children and adolescents who reported lower educational aspirations among those reporting psychological stress and

to a Norwegian study that reported higher aspirations among students reporting less hyperactivity and attention problems, and more intermediate rather than high aspirations among adolescents with emotional problems (Bania et al., 2015). On the other hand, our results contrast a Slovak adolescent study that did not show any association between adolescent's self-rated health and educational aspirations, however not specified as either physical or mental health (Madarasova Geckova et al., 2010).

Even though there are associations between social anxiety (both measured as screening positive/negative and on a continuous scale) and *plans for higher education*, these associations are less clear when looking at *plans for the future*. The association between social anxiety and *plans for the future* seems to become clearer after the age of 16. When looking at self-reported social anxiety symptoms (SPAI-C), the negative association with educational aspirations was only found among pupils in upper secondary school. A possible explanation for the lack of association among students in lower secondary school could be that they have not devoted much attention to future plans yet. The fact that a higher proportion of adolescents under the age of 16 answered no plans/don't know (48.6% vs. 35.4%) may reflect this issue. A high proportion of undecided individuals were also found by Bania et al. (2015) which studied a sample of 15-and 16-yr-olds. Interestingly, the results showed the opposite for general anxiety and depression symptoms (SCL-5), where increasing symptom levels were associated with aspirations of higher education only for individuals in the younger age group.

Interestingly, the lowest odds of having aspirations of higher education and future educational plans, were found among ADIS-C SP that did not meet to interview. This subgroup with regard to symptom load and sociodemographic characteristics is further discussed in Jystad et al. (2021).

Several authors have adjusted for socioeconomic background when studying associations between health impairments and educational aspirations (Bania et al., 2015; Almroth et al., 2018; Dobewall et al., 2019), and all our analyses were adjusted for subjective perception of family economic status, in addition to sex and age. Norway is a welfare state, and education, including university, is free. However, previous studies have shown that parent's education and employment seem to affect their children's probability of completing upper secondary school and choice of educational track, both in Norway and other Nordic welfare states like Finland (Koivusilta et al., 2013; Bania et al., 2015; Kallio et al., 2016; Haugan and Myhr, 2019), demonstrating that choice of career is affected by socioeconomic background.

To sum up, our results lend further support to previous findings indicating that mental health problems may represent obstacles to realize one's own full potential early in an educational pathway and contribute new information by showing the association for individuals with social anxiety, specifically.

Strengths and Limitations

Young-HUNT3 is a large population-based study inviting all adolescents aged 12–19 yr in former Nord Trøndelag county of Norway. In the case of social anxiety, the use of a population sample rather than a clinical sample is beneficial; due to shyness, avoidant behavior, and fear of authority figures, individuals with social anxiety tend not to seek help for their problems (Wittchen et al., 1999; Grant et al., 2005). In addition, the study is based on both self-reported social anxiety symptoms (SPAI-C) as well as screening information based on interviews performed by specially trained nurses (ADIS-C).

As this study was based on cross-sectional data, there are substantial limitations when interpreting the associations found, yielding it important to investigate this relationship further using prospective data. Another limitation may be the operationalization of school functioning. The five items of school functioning that we used were based on three indices (behavior difficulties/attention problems, school enjoyment, and social exclusion) retrieved from principal component analysis based on 14 items and two single items that covered other important areas of school functioning (truancy and learning difficulties). Although this instrument has been used in previous studies (De Ridder et al., 2013; Ranøyen et al., 2014), the instrument lacks proper validation.

Also, in our multiple regression analysis, when measuring associations between social anxiety and educational aspirations, we adjusted for sex, age, and family economic status. Due to previous report of higher average marks being associated with higher educational aspirations (Bania et al., 2015), as well as a study controlling for academic achievement when measuring associations between health and aspirations (Dobewall et al., 2019), it could be argued that the indications of school functioning should be adjusted for. If school functioning were to be an important covariate, it is possible that we have overestimated the association between social anxiety and educational aspirations. Our decision for not adjusting for school functioning in our main analyses is based on the assumption of school functioning primarily being a consequence of social anxiety. Despite this, one cannot omit the possibility of school functioning and social anxiety working bi-directionally, which has been found for peer victimization and social anxiety among boys (Ranta et al., 2013). Last, our study did not contain information regarding parental expectations, parental educational status, or family structure, which in other studies have shown to be associated with adolescent's future educational plans (Garg et al., 2007; Madarasova Geckova et al., 2010; Christofides et al., 2015), and theoretically also could have an impact on social anxiety status. Therefore, one needs to carefully interpret the results.

CONCLUSION

Our results indicate that social anxiety, measured as self-reported social anxiety symptoms and SAD screening interview, is related to lower school functioning in terms of higher tendency of behavior difficulties/attention problems, social exclusion, truancy, learning difficulties. In addition to lack of enjoyment, as well as aspirations of higher education, among Norwegian adolescents. Further studies should investigate

prospectively the associations between social anxiety disorder in adolescence and later educational and professional achievements using registry data. In addition, our findings may have valuable implications for teachers and other school professionals that should be observant of social anxiety among pupils showing behavioral difficulties and/or attention problems and truancy. And finally, considering previous evidence of school engagement being positively associated with life satisfaction (Lewis et al., 2011), our findings of school dissatisfaction among adolescents with social anxiety underscores the importance of detection of social anxiety at an early stage, making interventions possible.

DATA AVAILABILITY STATEMENT

The Trøndelag Health Study (HUNT) has invited persons aged 13–100 yr to four surveys between 1984 and 2019. Comprehensive data from more than 140,000 persons having participated at least once and biological material from 78,000 persons are collected. The data are stored in HUNT databank and biological material in HUNT biobank. HUNT Research Center has permission from the Norwegian Data Inspectorate to store and handle these data. The key identification in the data base is the personal identification number given to all Norwegians at birth or immigration, whilst de-identified data are sent to researchers upon approval of a research protocol by the Regional Ethical Committee and HUNT Research Center. To protect participants' privacy, HUNT Research Center aims to limit storage of data outside HUNT databank, and cannot deposit data in open repositories. HUNT databank has precise information on all data exported to different projects and are able to reproduce these on request. There are no restrictions regarding data export given approval of applications to HUNT Research Center. For more information see: http://www.ntnu.edu/hunt/data. Requests to access the datasets should be directed to http://www.ntnu.edu/hunt/data.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Regional Committee for Medical and Health Research Ethics. Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin.

AUTHOR CONTRIBUTIONS

All authors participated in planning the outlines of the study, including strategy for data usage, and analysis. IJ conducted the analysis with assistance from ES and JV. IJ wrote the outlines of the manuscript, with input and support from all authors, did the majority of work on all aspects of writing introduction, methodology, results and discussion, with support, and contribution from all authors. All authors contributed to the article and approved the submitted version.

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SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2021.727529/full#supplementary-material

REFERENCES

Acquah, E. O., Topalli, P.-Z., Wilson, M. L., Junttila, N., and Niemi, P. M. (2016). Adolescent loneliness and social anxiety as predictors of bullying victimisation. *Int. J. Adolesc. Youth* 21, 320–331. doi: 10.1080/02673843.2015.1083449

Almroth, M. C., László, K. D., Kosidou, K., and Galanti, M. R. (2018). Association between adolescents' academic aspirations and expectations and mental health: a 1-year follow-up study. *Eur. J. Public Health* 28, 504–509. doi: 10.1093/eurpub/cky025

American Psychiatric Association (2000). *Diagnostic and Statistical Manual of Mental Disorders, 4th Edn*. Washington, DC: American Psychiatric Association.

Aune, T., and Hjemdal, O. (2017). Måleegenskaper ved den norske versjonen av the Social Phobia and Anxiety Inventory for Children (SPAI-C). [Measuring properties of the Norwegian version of the Social Phobia and Anxiety Inventory for Children (SPAI-C).] Norwegian. *Psyk. Test Barn.* 1:4. doi: 10.21337/0051

Bania, E. V., Eckhoff, C., and Kvernmo, S. (2015). The influence of mental health, psychosocial factors, and educational skills on the educational aspirations of indigenous sámi and non-indigenous adolescents in the Arctic. *Scand. J. Child Adolesc. Psychiatr. Psychol.* 3, 169–179. doi: 10.21307/asjcapp-2015-017

Beal, S. J., and Crockett, L. J. (2010). Adolescents' occupational and educational aspirations and expectations: links to high school activities and adult educational attainment. *Dev. Psychol.* 46, 258–265. doi: 10.1037/a0017416

Beidel, D. C., Turner, S. M., and Morris, T. L. (1995). A new inventory to assess childhood social anxiety and phobia: the social phobia and anxiety inventory for children. *Psychol. Assess.* 7, 73–79. doi: 10.1037/1040-3590.7.1.73

Beidel, D. C., Turner, S. M., and Morris, T. L. (1999). Psychopathology of childhood social phobia. *J. Am. Acad. Child Adolesc. Psychiatry* 38, 643-650. doi: 10.1097/00004583-199906000-00010

Bernstein, G. A., Bernat, D. H., Davis, A. A., and Layne, A. E. (2008). Symptom presentation and classroom functioning in a non-clinical sample of children with social phobia. *Depress. Anxiety* 25, 752-760. doi: 10.1002/da.20315

Chapman, J., Halldorsson, B., and Creswell, C. (2020). Mental imagery in social anxiety in children and young people: a systematic review. *Clin. Child Fam. Psychol. Rev.* 23, 379–392. doi: 10.1007/s10567-020-00316-2

Chartier, M. J., Walker, J. R., and Stein, M. B. (2001). Social phobia and potential childhood risk factors in a community sample. *Psychol. Med.* 31, 307–315. doi: 10.1017/S0033291701003348

Chiu, K., Clark, D. M., and Leigh, E. (2021). Prospective associations between peer functioning and social anxiety in adolescents: a systematic review and meta-analysis. *J. Affect. Disord.* 279, 650-661. doi: 10.1016/j.jad.2020.10.055

Christofides, L. N., Hoy, M., Milla, J., and Stengos, T. (2015). Grades, aspirations, and post-secondary education outcomes. *Can. J. High. Educ.* 45, 48-82. doi: 10.47678/cjhe.v45i1.184203

Davidson, J. R. T., Hughes, D. L., George, L. K., and Blazer, D. G. (1993). The epidemiology of social phobia: findings from the duke epidemiological catchment area study. *Psychol. Med.* 23, 709–718. doi: 10.1017/S0033291700025484

de Lijster, J. M., Dieleman, G. C., Utens, E. M. W. J., Dierckx, B., Wierenga, M., Verhulst, F. C., et al. (2018). Social and academic functioning in adolescents with anxiety disorders: a systematic review. *J. Affect. Disord.* 230, 108–117. doi: 10.1016/j.jad.2018.01.008

De Ridder, K. A. A., Pape, K., Cuypers, K., Johnsen, R., Holmen, T. L., Westin, S., et al. (2013). High school dropout and long-term sickness and disability in young adulthood: a prospective propensity score stratified cohort study (the young-HUNT study). *BMC Public Health* 13:941. doi: 10.1186/1471-2458-13-941

De Ridder, K. A. A., Pape, K., Johnsen, R., Westin, S., Holmen, T. L., and Bjørngaard, J. H. (2012). School dropout: a major public health challenge: a 10-year prospective study on medical and non-medical social insurance benefits in young adulthood, the young-HUNT 1 study (Norway). *J. Epidemiol. Commun. Health* 66, 995–1000. doi: 10.1136/jech-2011-200047

Derogatis, L. R., Lipman, R. S., Rickels, K., Uhlenhuth, E. H., and Covi, L. (1974). The Hopkins symptom checklist (HSCL): a self-report symptom inventory. *Behav. Sci.* 19, 1–15. doi: 10.1002/bs.3830190102

Dobewall, H., Lindfors, P., Karvonen, S., Koivusilta, L., Vainikainen, M.-P., Hotulainen, R., et al. (2019). Health and educational aspirations in adolescence: a longitudinal study in Finland. *BMC Public Health* 19:1447. doi: 10.1186/s12889-019-7824-8

Egger, H. L., Costello, J. E., and Angold, A. (2003). School refusal and psychiatric disorders: a community study. *J. Am. Acad. Child Adolesc. Psychiatry* 42, 797-807. doi: 10.1097/01.CHI.0000046865.56865.79

Erath, S. A., Flanagan, K. S., Bierman, K. L., and Tu, K. M. (2010). Friendships moderate psychosocial maladjustment in socially anxious early adolescents. *J. Appl. Dev. Psychol.* 31, 15-26. doi: 10.1016/j.appdev.2009.05.005

Essau, C. A., Conradt, J., and Petermann, F. (1999). Frequency and comorbidity of social phobia and social fears in adolescents. *Behav. Res. Ther.* 37, 831–843. doi: 10.1016/S0005-7967(98)00179-X

Furman, W., and Buhrmester, D. (1992). Age and sex differences in perceptions of networks of personal relationships. *Child Dev.* 63, 103-115. doi: 10.2307/1130905

Garg, R., Melanson, S., and Levin, E. (2007). Educational aspirations of male and female adolescents from single-parent and two biological parent families: a comparison of influential factors. *J. Youth Adolesc.* 36, 1010-1023. doi: 10.1007/s10964-006-9137-3

Grant, B. F., Hasin, D. S., Blanco, C., Stinson, F. S., Chou, S. P., Goldstein, R. B., et al. (2005). The epidemiology of social anxiety disorder in the united states: results from the national epidemiologic survey on alcohol and related conditions. *J. Clin. Psychiatry* 66, 1351–1361. doi: 10.4088/JCP.v66n1102

Gren-Landell, M., Aho, N., Andersson, G., and Svedin, C. G. (2011). Social anxiety disorder and victimization in a community sample of adolescents. *J. Adolesc.* 34, 569–577. doi: 10.1016/j.adolescence.2010.03.007

Gren-Landell, M., Tillfors, M., Furmark, T., Bohlin, G., Andersson, G., and Svedin, C. (2009). Social phobia in Swedish adolescents. *Soc. Psychiat. Epidemiol.* 44, 1–7. doi: 10.1007/s00127-008-0400-7

Gutman, L. M., and Schoon, I. (2018). Emotional engagement, educational aspirations, and their association during secondary school. *J. Adolesc.* 67, 109-119. doi: 10.1016/j.adolescence.2018.05.014

Haugan, T., and Myhr, A. (2019). Residential mobility, family structure, and completion of upper secondary education–a registry-based cohort study of the norwegian adolescent population. *Front. Psychol.* 10:2311. doi: 10.3389/fpsyg.2019.02311

Hofmann, S. G., Albano, A. M., Heimberg, R. G., Tracey, S., Chorpita, B. F., and Barlow, D. H. (1999). Subtypes of social phobia in adolescents. *Depress. Anxiety* 9, 15-18.

Holmen, J., Midthjell, K., Krüger, Ø., Langhammer, A., Holmen, T. L., Bratberg, G., et al. (2003). The Nord-Trøndelag health study 1995–97 (HUNT 2): objectives, contents, methods and participation. *Nor. Epidemiol.* 13, 19–32. doi: 10.5324/nje.v13i1.305

Holmen, T. L., Bratberg, G., Krokstad, S., Langhammer, A., Hveem, K., Midthjell, K., et al. (2013). Cohort profile of the young-HUNT study, Norway: a population-based study of adolescents. *Int. J. Epidemiol.* 43, 536–544. doi: 10.1093/ije/dys232

Ingul, J. M. (2014). *Anxiety and school phobia in Norwegian adolescents. Studies of risk factors, school absenteeism and treatment effects*. (Ph.D. thesis), NTNU, Trondheim, Norway.

Ingul, J. M., Klöckner, C. A., Silverman, W. K., and Nordahl, H. M. (2012). Adolescent school absenteeism: modelling social and individual risk factors. *Child Adolesc. Ment. Health* 17, 93-100. doi: 10.1111/j.1475-3588.2011.00615.x

Jystad, I., Bjerkeset, O., Haugan, T., Sund, E. R., and Vaag, J. (2021). Sociodemographic correlates and mental health comorbidities in adolescents with social anxiety: the young-HUNT3 study, Norway, *Front. Psychol.* 12:663161. doi: 10.3389/fpsyg.2021.663161

Kallio, J. M., Kauppinen, T. M., and Erola, J. (2016). Cumulative socio-economic disadvantage and secondary education in Finland. *Eur. Sociol. Rev.* 32, 649–661. doi: 10.1093/esr/jcw021

Kearney, C. A. (2008). School absenteeism and school refusal behavior in youth: a contemporary review. *Clin. Psychol. Rev.* 28, 451-471. doi: 10.1016/j.cpr.2007.07.012

Kearney, C. A., and Silverman, W. K. (1996). The evolution and reconciliation of taxonomic strategies for school refusal behavior. *Clin. Psychol. Sci. Pract.* 3, 339–354. doi: 10.1111/j.1468-2850.1996.tb00087.x

Kessler, R. C. (2003). The impairments caused by social phobia in the general population: implications for intervention. *Acta Psychiatr. Scand.* 108, 19-27. doi: 10.1034/j.1600-0447.108.s417.2.x

Khattab, N. (2015). Students' aspirations, expectations and school achievement: what really matters? *Br. Educ. Res. J.* 41, 731-748. doi: 10.1002/berj.3171

Koivusilta, L. K., West, P., Vesa Markus Antero, S., Nummi, T., and Rimpelä, A. H. (2013). From childhood socio-economic position to adult educational level—do health behaviours in adolescence matter? A longitudinal study. *BMC Public Health* 13:711. doi: 10.1186/1471-2458-13-711

Krokstad, S., Kunst, A. E., and Westin, S. (2002). Trends in health inequalities by educational level in a Norwegian total population study. *J. Epidemiol. Commun. Health* 56, 375–380. doi: 10.1136/jech.56.5.375

Krokstad, S., Langhammer, A., Hveem, K., Holmen, T., Midthjell, K., Stene, T., et al. (2012). Cohort profile: the HUNT study, Norway. *Int. J. Epidemiol.* 42, 968–977. doi: 10.1093/ije/dys095

La Greca, A. M., and Lopez, N. (1998). Social anxiety among adolescents: linkages with peer relations and friendships. *J. Abnorm. Child Psychol.* 26, 83–94. doi: 10.1023/A:1022684520514

Larson, R., and Richards, M. H. (1991). Daily companionship in late childhood and early adolescence: changing developmental contexts. *Child Dev.* 62, 284–300. doi: 10.2307/1131003

Lewis, A. D., Huebner, E. S., Malone, P. S., and Valois, R. F. (2011). Life satisfaction and student engagement in adolescents. *J. Youth Adolesc.* 40, 249-262. doi: 10.1007/s10964-010-9517-6

Madarasova Geckova, A., Tavel, P., van Dijk, J. P., Abel, T., and Reijneveld, S. A. (2010). Factors associated with educational aspirations among adolescents: cues to counteract socioeconomic differences? *BMC Public Health* 10:154. doi: 10.1186/1471-2458-10-154

Mychailyszyn, M. P., Mendez, J. L., and Kendall, P. C. (2010). School functioning in youth with and without anxiety disorders: comparisons by diagnosis and comorbidity. *Sch. Psych. Rev.* 39, 106–121. doi: 10.1080/02796015.2010.12087793

Myhr, A., Haugan, T., Lillefjell, M., and Halvorsen, T. (2018). Non-completion of secondary education and early disability in Norway: geographic patterns, individual and community risks. *BMC Public Health* 18:682. doi: 10.1186/s12889-018-5551-1

OECD (2017). *PISA 2015 Results: Students' Well-Being, Vol. 3*, Paris: OECD Publishing. doi: 10.1787/9789264273856-en

Parker, J., and Asher, S. (1987). Peer relations and later personal adjustment: are low-accepted children at risk? *Psychol. Bull.* 102, 357–389. doi: 10.1037/0033-2909.102.3.357

Pflug, V., and Schneider, S. (2016). School absenteeism: an online survey via social networks. *Child Psychiatry Hum. Dev.* 47, 417–429. doi: 10.1007/s10578-015-0576-5

Ranøyen, I., Jozefiak, T., Wallander, J., Lydersen, S., and Indredavik, M. (2014). Self-reported social anxiety symptoms and correlates in a clinical (CAP) and a community (Young-HUNT) adolescent sample. *Soc. Psychiatry Psychiatr. Epidemiol.* 49, 1937–1949. doi: 10.1007/s00127-014-0888-y

Ranta, K., Kaltiala-Heino, R., Fröjd, S., and Marttunen, M. (2013). Peer victimization and social phobia: a follow-up study among adolescents. *Soc. Psychiatry Psychiatr. Epidemiol.* 48, 533–544. doi: 10.1007/s00127-012-0583-9

Ranta, K., Kaltiala-Heino, R., Rantanen, P., and Marttunen, M. (2009). Social phobia in finnish general adolescent population: prevalence, comorbidity, individual and family correlates, and service use. *Depress. Anxiety* 26, 528–536. doi: 10.1002/da.20422

Ranta, K., La Greca, A. M., Kaltiala-Heino, R., and Marttunen, M. (2016). Social phobia and educational and interpersonal impairments in adolescence: a prospective study. *Child Psychiatry Hum. Dev.* 47, 665–677. doi: 10.1007/s10578-015-0600-9

Rapee, R. M., and Spence, S. H. (2004). The etiology of social phobia: empirical evidence and an initial model. *Clin. Psychol. Rev.* 24, 737–767. doi: 10.1016/j.cpr.2004.06.004

Rasmussen, L.-M. P., and Neumer, S.-P. (2015). Måleegenskaper ved den norske versjonen av anxiety disorders interview schedule for DSM IV: Barneversjon (ADIS for DSM IV:C). [Measuring properties of the Norwegian version of Anxiety Disorders Interview Schedule for DSMIV: Child Version (ADIS for DSM IV:C).] Norwegian. *Psyk. Test Barn*. doi: 10.21337/0044

Rothon, C., Arephin, M., Klineberg, E., Cattell, V., and Stansfeld, S. (2011). Structural and socio-psychological influences on adolescents' educational aspirations and subsequent academic achievement. *Soc. Psychol. Educ.* 14, 209–231. doi: 10.1007/s11218-010-9140-0

Smith, P. K., Cowie, H., Olafsson, R. F., and Liefooghe, A. P. D. (2002). Definitions of bullying: a comparison of terms used, and age and gender differences, in a fourteen–country international comparison. *Child Dev.* 73, 1119-1133. doi: 10.1111/1467-8624.00461

StataCorp. (2017). *Stata Statistical Software V 15*. College Station, TX: StataCorp LLC.

Stein, D. J., Lim, C. C. W., Roest, A. M., de Jonge, P., Aguilar-Gaxiola, S., Al-Hamzawi, A., et al. (2017). The cross-national epidemiology of social anxiety disorder: data from the world mental health survey initiative. *BMC Med.* 15, 1–21. doi: 10.1186/s12916-017-0889-2

Stevens, S. E., Steele, C. A., Jutai, J. W., Kalnins, I. V., Bortolussi, J. A., and Biggar, W. D. (1996). Adolescents with physical disabilities: some psychosocial aspects of health. *J. Adolesc. Health* 19, 157-164. doi: 10.1016/1054-139X(96)00027-4

Storch, E. A., Masia-Warner, C., Dent, H. C., Roberti, J. W., and Fisher, P. H. (2004). Psychometric evaluation of the social anxiety scale for adolescents and the social phobia and anxiety inventory for children: construct validity and normative data. *J. Anxiety Disord.* 18, 665–679. doi: 10.1016/j.janxdis.2003.09.002

Strand, B. H., Dalgard, O. S., Tambs, K., and Rognerud, M. (2003). Measuring the mental health status of the Norwegian population: a comparison of the instruments SCL-25, SCL-10, SCL-5 and MHI-5 (SF-36). *Nord. J. Psychiatry* 57, 113–118. doi: 10.1080/08039480310000932

Van Ameringen, M., Mancini, C., and Farvolden, P. (2003). The impact of anxiety disorders on educational achievement. *J. Anxiety Disord.* 17, 561–571. doi: 10.1016/S0887-6185(02)00228-1

Van Roy, B., Kristensen, H., Groholt, B., and Clench-Aas, J. (2009). Prevalence and characteristics of significant social anxiety in children aged 8–13 years: a Norwegian cross-sectional population study. *Soc. Psychiatry Psychiatr. Epidemiol.* 44, 407–415. doi: 10.1007/s00127-008-0445-7

Vilaplana-Pérez, A., Pérez-Vigil, A., Sidorchuk, A., Brander, G., Isomura, K., Hesselmark, E., et al. (2020). Much more than just shyness: the impact of social anxiety disorder on educational performance across the lifespan. *Psychol. Med.* 51, 1–9. doi: 10.1017/S0033291719003908

Wittchen, H. U., Stein, M. B., and Kessler, R. C. (1999). Social fears and social phobia in a community sample of adolescents and young adults: prevalence, risk factors and co-morbidity. *Psychol. Med.* 29, 309–323. doi: 10.1017/S0033291798008174

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Relationships Between Achievement Goal Orientations, Learning Engagement, and Academic Adjustment in Freshmen: Variable-Centered and Person-Centered Approaches

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Academic adjustment is a principal determining factor of undergraduate students' academic achievement and success. However, studies pay little attention to freshmen's antecedent variables of academic adjustment. This study aimed to examine the mechanisms underlying the relationship between achievement goal orientations and academic adjustment in freshmen using variable- and person-centered approaches. A sample of 578 freshmen (aged 18.29 ± 1.04 years, 58.5% female) completed questionnaires on achievement goal orientations, learning engagement, and academic adjustment. Latent profile analysis of achievement goal orientations revealed four groups: low-motivation (11.1%), approach-oriented (9.5%), average (52.8%), and multiple (26.6%). In the mediating analysis, results of the variable-centered approach showed that learning engagement mediated the effects of the mastery-approach and performance-avoidance goals on academic adjustment. For the person-centered approach, we selected the average type as the reference profile, and the analysis revealed that compared with the reference profile, learning engagement partially mediated the link between the approach-oriented profile and academic adjustment. The current study highlights the important role that achievement goal orientations and learning engagement play in academic adjustment. We discuss the implications and limitations of the findings.

Keywords: freshmen, achievement goal orientations, learning engagement, academic adjustment, person-centered, variable-centered

INTRODUCTION

When freshmen enter the campus, they encounter challenges in the form of a series of internal and external environmental changes, such as facing a new social environment, adjusting to new roles and responsibilities, and developing new academic and social relationships (Aderi et al., 2013). These challenges often contribute to various problems, such as anxiety, depression, loneliness, and withdrawal (Arjanggi and Kusumaningsih, 2016; Darlow et al., 2017;

Lindell et al., 2020). Academic adjustment is a necessary component to overcome the above-mentioned challenges and plays a pivotal role in freshmen's college adaptation. It refers to the degree of students' adaptation to their academic demands, which include attitudes toward the curriculum, engagement with course material, and academic effort (Baker and Siryk, 1984).

To be competent in a new learning environment, students need to alter their customary learning habits and strategies (Awad et al., 2014). However, this is often accompanied by a lack of learning motivation and a decline in academic performance (Tuominen-Soini et al., 2012), which are further related to stress, anxiety, smoking, and alcohol consumption (Morrison and Cosden, 1997). To advance our understanding of academic adjustment and promote adjustment to campus life in freshmen, we explored the antecedents of academic adjustment.

Recently, investigators have demonstrated that numerous personal traits and social environments predict student academic adjustment. Factors include individual traits, parental relationships, social support, and motivations (Crede and Niehorster, 2012; van Rooij et al., 2018; Montgomery et al., 2019). Among these preconditions, achievement goal orientations are important (Kaplan and Maehr, 2007) because they are motivation-related constructs. They refer to the disposition reflecting the general tendency of students to select specific goals and favor specific outcomes in the context of achievement (Dweck, 1986). Several decades of research highlight the benefits of achievement goals in supporting students' learning adjustment and engagement (Linnenbrink-Garcia and Wormington, 2019), whereby achievement goals help to influence adolescents' maladaptive academic functioning and contribute to explaining and predicting behavior in an academic environment (Xu et al., 2020). Overall, mastery-approach and performance-approach goals indicate positive effects on the academic adjustment while mastery-avoidance and performance-avoidance goals indicate negative effects (Baranik et al., 2010; Van Yperen et al., 2015; Tian et al., 2017; Honicke et al., 2020). Most studies suggested that girls possess higher mastery-approach goals and lower performance-avoidance goals and boys are more performance-oriented than girls (Butler, 2014; Mouratidis et al., 2017; Yu and McLellan, 2019).

Previous studies primarily examined the direct effects of achievement goal orientations on academic adjustment. However, there is a lack of in-depth studies on how achievement goal orientations relate to academic adjustment. Based on the integrative development-in-sociocultural-context model, engagement is conceptualized as an enriching multidimensional construction shaped by interactions between the individual and the environment. The model emphasizes that engagement has been examined as a pathway or process through which personal factors shape learning outcomes (Skinner and Pitzer, 2012; Skinner et al., 2016). Firstly, students vary in their level of learning engagement. For the differences, the reason is their motivations in achievement goals (Daumiller et al., 2021). Bipp et al. (2021) pointed out that achievement goal orientations are important for students to ensure quality learning experiences in the school environment. Secondly, learning engagement plays a prominent role in shaping adolescents' adjustment and is an important construct to promote learning among college students (Poortvliet et al., 2015; Skinner et al., 2016). Engagement, as outlined by Schaufeli et al. (2002), is a better construct to understand what makes students go the extra mile, and it purports to measure students' psychological presence and involvement in their study. Also, engagement means an emerging learning attitude. Therefore, based on these findings, we investigated whether achievement goal orientations affect academic adjustment *via* learning engagement.

To date, most studies in the achievement goal orientations field have focused only on the variable-centered approach which expressed how different forms of specific goals were uniquely and independently related to specific outcomes (Linnenbrink-Garcia and Wormington, 2019). However, this approach ignores potential variability and differences among individuals, and can mask vital individual patterns of achievement goal orientations within subgroups of individuals (Tuominen-Soini et al., 2012). For example, it is obviously difficult to distinguish the students who only take mastery goals and students who take both mastery goals and performance goals. In contrast, the multiple goals perspective of the person-centered approach classifies students into homogenous groups with similar goal orientation profiles and is benefit to learn the students' generalized motivational tendencies (see Niemivirta, 2002). The person-centered approach of achievement goal orientations suggests that students may pursue multiple goals simultaneously or seek to attain a single outcome for multiple reasons or serve multiple functions by striving for certain goals in the school environment (Tuominen-Soini et al., 2008, 2011). Wormington and Linnenbrink-Garcia (2017) indicated that the person-centered approach, which provides an accurate representation of multiple goal pursuits and broadens the consideration of multiple goals, can extend the findings obtained using the variable-centered approach. In fact, the variable-centered and person-centered approach are closely related and complement each other (Bergman and Trost, 2006), and the combination comprehensively discussed the association between achievement goal orientations, learning engagement, and academic adjustment. Neither of these single approaches is sufficient to study achievement goal orientations accurately. Researchers can collectively benefit from the results of variable-centered and person-centered analyses and acquire valuable information on achievement goal theory. It is worthwhile to mention that few studies have used a person-centered approach, and even fewer have applied a combination of these two approaches. Therefore, in this study, we extended this prior work by focusing on a broader set of achievement goal orientations, aiming to investigate the interactions between achievement goal orientations, learning engagement, and academic adjustment by combining the two techniques.

Investigation of the Profiles of Achievement Goal Orientations

Person-centered approach in achievement goals represents multiple goal pursuit which complement variable-centered findings and expand the consideration of multiple goals beyond

mastery-approach and performance-approach goals alone. The approach is meaningful to provide a clearer understanding of which combinations of goals typically emerge in a population. There has been extensive work on classifying achievement goal orientations, which comprise five main combinations: a basic mastery profile [i.e., mastery- and learning-oriented (Tapola and Niemivirta, 2008; Tapola et al., 2014; Peixoto et al., 2016)], a basic performance profile [i.e., performance-oriented and low-mastery/high-performance (Tuominen-Soini et al., 2012; Gonçalves et al., 2017)], a mastery and performance-approach goals combined profile [i.e., success-oriented, multiple goals cluster, and approach-oriented group (Daniels et al., 2008; Tuominen-Soini et al., 2008, 2011; Luo et al., 2011; Zhang et al., 2016)], a moderate or low profile [i.e., indifferent, average goals (Tuominen-Soini et al., 2008, 2011; Jansen In de Wal et al., 2016) low-mastery/low-performance, low-motivation, and disaffected (Daniels et al., 2008; Gonçalves et al., 2017)], and a profile emphasizing avoidance [i.e., avoidance-oriented students (Daniels et al., 2008; Tuominen-Soini et al., 2008, 2012)]. In this study, we employed the latent profile analysis (LPA), a person-centered approach, to classify the research objects. LPA is useful in describing the types of achievement goal orientations and is optimally suited to identify which individuals may benefit from different combination of goals to adapt the learning environment. Therefore, the present study aimed to do the similar classification in Chinese freshmen. We expected to detect several meaningful types of achievement goal orientations, which highlighted either a single or a combination of goal orientations. Based on the previous literature, we hypothesized that we would identify groups of students with five dominant tendencies of mastery-oriented, performance-oriented, approach-oriented, avoidance-oriented, and low-motivation (Hypothesis 1). We identified common patterns of goals profiles first and then compared the benefits of endorsing different goal profiles with learning engagement and academic adjustment.

Achievement Goal Orientations and Academic Adjustment

The achievement goal theory is one of the most influential theories to explain and predict the direction and intensity of individuals' behavior in school-related situations (Xiang et al., 2017), which has experienced a 30 year change in processes. Initially, achievement goal orientations were characterized by students' aims for task engagement, which were differentiated into two distinct types: mastery goals that focused on the development of competence and performance goals that were concerned with the demonstration of competence (Dweck, 1986). Subsequently, Elliot and Harackiewicz (1996) refined achievement goal orientations and established two types of performance goals. Elliot and McGregor (2001) proposed a more detailed extension that further divided mastery goals into approach and avoidance components, and a 2×2 model of achievement goal orientations was developed and tested. The quartered model emphasized two directions: the definition of competence and the valence of competence. The former refers to whether the individual considers their ability selectable (mastery and performance goals), whereas the latter refers to whether an individual pays attention to achieving positive outcomes (i.e., success; approach-oriented) or avoiding negative outcomes (i.e., failure; avoid-oriented). Specifically, mastery-approach goals are related to the motivation for improving knowledge, skills, and learning, whereas mastery-avoidance goals are concerned with the purpose of avoiding misunderstandings or failing to accomplish a task. Performance-approach goals focus on the endeavors to outperform others and demonstrate their superiority, whereas performance-avoidance goals represent the desire to avoid performing more poorly than others.

Recently, from the perspective of the variable-centered approach, investigators confirmed the effectiveness of the dimensions of achievement goal orientations on academic adjustment (Linnenbrink-Garcia and Wormington, 2019). These studies established that the direct relationships between the mastery-approach and performance-avoidance goals on academic adjustment are relatively consistent; however, some uncertainty remains regarding the relationship between the mastery-avoidance and performance-approach goals and academic adjustment. Specifically, mastery-approach goals are positively associated with adaptive coping strategies and positive behavior patterns, such as high levels of effort, persistence at a task, and adoption of deep learning strategies (Honicke et al., 2020). Therefore, we proposed Hypothesis 2a: Mastery-approach goals will positively predict academic adjustment.

Performance-avoidance goals are mainly associated with unfavorable results and maladaptive adjustment patterns (Van Yperen et al., 2014, 2015). Students who possessed performance-avoidance goals have a tendency to avoid learning, choose disorganized study strategies, or fail to use learning strategies. They exhibit high rates of burnout, lower self-efficacy, inactive learning interest, anxiety, shame, and hopelessness (Pekrun et al., 2006; Auvinen et al., 2015; Nadon et al., 2020). Thus, we proposed Hypothesis 2b: Performance-avoidance goals negatively predict academic adjustment.

Several studies have revealed that mastery-avoidance goals are linked to adaptive outcomes, such as learning interest (Baranik et al., 2010), whereas other studies have suggested that mastery-avoidance goals are more likely to be related to maladaptive outcomes, such as procrastination, disorganization, and declines in performance (Howell and Watson, 2007; Van Yperen et al., 2009). Thus, we proposed Hypothesis 2c: Mastery-avoidance goals negatively predict academic adjustment.

There is another ambiguous relationship between performance-approach goals and academic adjustment. Meece et al. (2006) showed that performance-approach goals are positively correlated with self-handicapping strategies and lower academic help-seeking. However, other researchers have found that these goals were positively correlated with adaptive behavior patterns, such as using learning strategies and making effort (Mouratidis et al., 2013; Tian et al., 2017). In collectivist cultural contexts, performance-approach goals are more likely to be associated with positive learning outcomes (Cheng and Lam, 2013; Datu, 2018). Therefore, taken together, we proposed Hypothesis 2d:

Performance-approach goals positively predict academic adjustment.

From the person-centered approach perspective and based on LPA results, researchers have explored the relationships between the profiles of achievement goal orientations and academic adjustment and found that the combination of goals predicting relevant adaptive outcomes of education remains controversial (Tuominen-Soini et al., 2012). Firstly, students with high mastery-oriented goals showed stronger ability to adapt to consequences and showed more adaptive patterns of motivation and academic wellbeing than those who possessed weak mastery ability. At the same time, mastery-oriented students may engage more time studying (Tapola and Niemivirta, 2008; Tuominen-Soini et al., 2012). Secondly, students who focused on both mastery- and performance-approach goals (approach-oriented goas) had two-sided adaptive outcomes (Daniels et al., 2008; Tuominen-Soini et al., 2008, 2011, 2012; Luo et al., 2011). On the one hand, several studies have suggested that these students are more likely to use cognitive strategies and make effort to achieve better academic performance and encounter difficulties than students with low motivation. Also, approach-oriented students are higher on self-efficacy, time management, and meta-cognitive self-regulation than are mastery-oriented students. On the other hand, other studies reported that these students experienced several positive outcomes, such as lower levels of anxiety and negative affect. Thirdly, because of the stronger concerns with performance, students with performance-oriented goals showed more school burnout, higher test anxiety, and higher negative affect than students in approach-oriented and mastery-oriented goals groups (Luo et al., 2011; Tuominen-Soini et al., 2012). Finally, students with low-mastery performance [low-motivation cluster (Daniels et al., 2008) and indifferent students (Tuominen-Soini et al., 2008, 2011)] or avoidance-oriented goals (Daniels et al., 2008; Tuominen-Soini et al., 2008, 2012) were similarly to those who were low in motivation and academic adjustment. Given the above-mentioned evidence, we hypothesized that from high to low level of goals' scores on adaptive academic achievement, these types are approach-oriented, mastery-oriented, and performance-oriented goals. The avoidance-oriented and low-motivation goals negatively predict academic adjustment (Hypothesis 3). However, the mechanisms underlying the relationship between achievement goal orientations and academic adjustment remain to be elucidated. It is important to gain insight into how achievement goal orientations affect academic adjustment. Therefore, this study sought to provide guidance for educational practitioners by exploring the effects of the mediating variable of learning engagement.

The Mediation of Learning Engagement

The integrative development-in-sociocultural-context model elaborates on the function of engagement in the key facilitators and consequences of identity engagement (Wang et al., 2019). The model emphasizes that engagement plays a dynamic developmental and reciprocal role in shaping youth's learning processes. In this model, engagement is conceptualized as an enriching multidimensional construction shaped by interactions between the individual and the environment. On the one hand, personal beliefs (e.g., competence beliefs) have been established as antecedents of engagement (Wang and Eccles, 2013). On the other hand, longitudinal studies have shown that engagement predicts children's educational outcomes, such as academic achievement (Li et al., 2019).

Learning engagement is a multifaceted construct in nature and mainly reflects individuals' varying patterns in cognition, emotion, and behavior (Phan, 2016). Schaufeli et al. (2002) were interested in the multifaceted composition of learning engagement and defined it as a persistent, positive, fulfilling, and learning-related state of mind that consists of three major motivation-related components: vigor, dedication, and absorption. Vigor refers to a high level of energy, resilience, willingness, and ability to study, and persistence in the face of difficulties. Dedication refers to a strong involvement in studying, accompanied by a sense of significance, enthusiasm, pride, and inspiration. Absorption refers to a pleasant state of complete immersion in studying, which is characterized by being unable to detach oneself from studying. Learning engagement is defined and highlighted by Schaufeli et al. (2002) as focusing on the positive aspects of a person's study and having educational implications. Studies have found that learning engagement is a principal determining factor of students' adjustment and achievement in educational settings (García-Ros et al., 2018; León et al., 2021; León and García-Martínez, 2021). Therefore, we would more fully explore the learning engagement and how learning engagement interacts with other education-related factors.

Studies using the variable-centered approach have demonstrated that learning engagement contributes to academic adjustment. Students who are highly engaged in work follow an overall positive adolescent development trajectory (Upadyaya and Salmela-Aro, 2013). Learning engagement is correlated with several academic aspects, such as adaptive coping strategies (e.g., meta-cognitive strategies), self-efficacy, performance, and academic success, and it is negatively correlated to test anxiety and ill-being (Upadyaya and Salmela-Aro, 2013; García-Ros et al., 2018; Vizoso et al., 2018). High learning engagement also improves students' wellbeing, which includes positive affect and life satisfaction (Upadyaya and Salmela-Aro, 2013).

According to the development-in-sociocultural-context model, developmental competencies and motivational beliefs work together to shape engagement (Wang et al., 2019). Achievement goal orientations as motivation-related constructs (Wigfield and Cambria, 2010) are predictors of adolescents' learning engagement (Shih, 2012), and important, albeit limited, empirical evidence has established such links. Specifically, both mastery-approach goals (Shih, 2012; Poortvliet and Perdeck, 2014; Nerstad et al., 2020; van Dam et al., 2020) and performance-approach goals (Shih, 2012; Barashev and Li, 2017) are positively related to learning engagement. Mastery-avoidance goals are unrelated to learning engagement (Poortvliet and Perdeck, 2014); however, studies have frequently found that they are positive predictors of work exhaustion (de Lange et al., 2010; Poortvliet et al., 2015).

Furthermore, performance-avoidance goals negatively predict learning engagement (Shih, 2012; Barashev and Li, 2017).

For the person-centered approach, Wormington and Linnenbrink-Garcia (2017) developed person-centered approaches to study achievement goals using meta-analytical techniques. They found that mastery- and approach-oriented profiles are adaptive profiles, and students with mastery-oriented goals had higher engagement than those with approach-oriented goals. Average and low all-goal profiles have shown the lowest levels of engagement. Moreover, the effects of high-performance approach and performance-avoidance profiles on engagement did not differ. However, Liu et al. (2020) reported that in Chinese educational contexts, the approach-oriented profile is the most adaptive to learning engagement, followed by the mastery-oriented profile.

In summary, from the perspective of variables, we proposed the following hypotheses: Mastery-approach and performance-approach goals positively and independently predict academic adjustment through learning engagement (Hypotheses 4a and b); mastery-avoidance and performance-avoidance goals negatively and independently predict academic adjustment through learning engagement (Hypotheses 4c and d). At the individual level, we predicted that approach-oriented (Hypothesis 5a) and mastery-oriented goals (Hypothesis 5b) would positively influence academic adjustment through learning engagement.

THE CURRENT STUDY

The variable-centered approach is helpful to quantify the individual variables' effects while controlling for potential confounds (Warren et al., 2021), but this approach might conceal important results and implications (Stern and Hertel, 2020). The person-centered approach instead examines how the combination of variables to function together and mainly focuses on subgroups of individuals with the most common patterns of scores observed according to the data (Lanza and Cooper, 2016). However, no previous study combined the both approach in achievement goal orientations field. In this study, we integrated information gathered using the person-centered approach with that gathered using the mainstream variable-centered approach and explored the goal pursuits of students. We identified the dimensions and profiles of achievement goal orientations that influenced academic adjustment and investigated whether learning engagement mediates the relationship between achievement goal orientations and academic adjustment. Firstly, we used LPA to study the profiles of achievement goal orientations in freshmen. Then, building on the variable-centered approach, we analyzed the mediating role of learning engagement on dimensions of achievement goal orientations and academic adjustment. Finally, based on the results of the LPA, we further explored whether learning engagement plays a mediating role in potential profiles of achievement goal orientations and academic adjustment. Taken together, we assessed the direct effect of achievement goal orientations on academic adjustment and the underlying mechanisms of this effect.

MATERIALS AND METHODS

Participants and Procedures

We estimated sample size by G*Power and calculated the minimum sample size. Based on our preliminary research, we set an alpha of 0.05, power $(1-\beta)$ of 0.80, and an effect size of 0.04. The sample size was 191. In this study, a total of 590 college students were recruited from universities in northeast China using random sampling. Due to missing or invalid responses, 12 participants were not included in the analyses. Therefore, the final sample consisted of 578 participants (338 females, 58.5%). Mean age was 18.29 years [standard deviation (SD) = 1.04]. During the first month of the new semester (in October 2018), the first author with the assistance of teachers used questionnaires to assess freshmen's goals, learning engagement, and academic adjustment at a public university located in China. Participants were informed that all information would be kept confidential and that they could withdraw from the study at any time. Questionnaires took 5 min to complete. The study was approved by the Academic Ethics Committee of the College of Psychology of Northeast Normal University.

Measures

Achievement Goal Orientations

An adaptation of the 29-item achievement goal orientations questionnaire (Liu and Guo, 2003) was used to measure the four dimensions of achievement goal orientations: mastery-approach (nine items, e.g., "In class, my goal is to learn as much as possible"), mastery-avoidance (five items, e.g., "When I study, the most worries are that others think of me as stupid"), performance-approach (nine items, e.g., "In class, my goal is to be better than others"), and performance-avoidance (six items, e.g., "I won't ask the teacher questions that I can't solve by myself, because I don't want the teacher to think that I'm stupid"). Participants rated each item on a five-point scale from 1 = not true to 5 = certainly true. In this study, the reliability of the sub-scales in this study was in order 0.74, 0.71, 0.82, and 0.81, and the total alpha coefficient was 0.87.

Learning Engagement

We used the learning engagement subscale from the Utrecht Work Engagement Scale-Student (UWES-S; Schaufeli et al., 2002), revised by Fang et al. (2008). It measures learning engagement on along dimensions: vigor, dedication, and absorption. The final version of the scale consisted of 17 items (e.g., "At my academic work, I feel as though I am bursting with energy") and all items were rated on a seven-point Likert scale (1 = Never to 7 = Always), where a higher score indicated a higher level of learning engagement. In this study, the reliability of the sub-scales in this study was in order 0.86, 0.88, and 0.88, and the total alpha coefficient was 0.94.

Academic Adjustment

Academic adjustment was measured using the 29-item academic adjustment of undergraduates in China scale (Feng et al., 2006).

It comprised five factors: learning motivation, learning ability, teaching model, learning attitude, and learning environment (e.g., "I can't adapt to the college schedule"). On a five-point Likert scale (1 = not true to 5 = certainly true), students were asked to rate how strongly they agreed with each statement. In this study, the reliability of the sub-scales in this study was in order 0.75, 0.77, 0.78, 0.72, and 0.62, and the total alpha coefficient was 0.84.

Statistical Analyses

Mardia's Skewness and Mardia's Kurtosis were used to assess multivariate distribution by the online WebPower (Liu, 2013). Results showed Skewness ($b = 2.75$, $z = 264.68$, $p < 0.05$) and Kurtosis ($b = 57.23$, $z = 11.33$, $p < 0.05$), and indicated the absence of multivariate normality. Knief and Forstmeier (2018) suggested that comparing with other violations or alternative approaches, violations of multivariate normality may be less detrimental to the interpretation of findings, so we choose to process with the analyses using 1,000 bootstraping (Pek et al., 2018). To test our hypotheses, we performed five steps to conduct the variable-centered and person-centered analyses and controlled for sex. Preliminary analyses included descriptive statistics and correlation analysis. Second, we used LPA to identify profiles along the dimensions of achievement goal orientations using Mplus8.0 (Muthén and Muthén, 1998–2015) and validated the efficacy of the classifiers. Third, we performed ANOVAs and *post-hoc* comparisons (Bonferroni adjustment) to analyze the relationships between achievement goal orientations types, learning engagement, and academic adjustment. Fourth, we performed a mediation analysis among the three variables using MEDIATE in SPSS 22.0 (Hayes and Scharkow, 2013). Finally, we tested the mediation effect of learning engagement on achievement goal orientations profiles and academic adjustment using the bootstrap method by running the PROCESS plugin in the SPSS 22.0 software (Hayes, 2018). In the PROCESS, we used the ordinary least squares (OLS) to estimate the parameter in mediation model.

To explore the potential profiles of freshmen's achievement goal orientations, potential profiles were analyzed by fitting a model that varied in solutions from 2 to 5 classes. Following Nylund's (2007) suggestion, model fit comparisons are based on the following indicators: Akaike's information criterion (AIC), Bayesian information criterion (BIC), adjusted BIC (aBIC), Lo-Mendell-Rubin likelihood ratio (LMR-LRT), bootstrap likelihood ratio (BLRT), and entropy. The model with a smaller AIC, BIC, and ABIC is better. If values of p of the LMR-LRT and BLRT are less than 0.05, this implies that the k-class model is significantly better than the k-1-class model. Higher entropy indicates few classification errors.

We investigated subsequent mediation effects by comparing the effects of profiles and learning engagement on academic adjustment. Based on the LPA, we explored the mediating role of learning engagement in achievement goal orientations profiles and academic adjustment (hypotheses 3 and 5). When the independent variable was multi-categorical, we used the method that integrated relative and omnibus mediation to analyze the mediation effect (Iacobucci, 2012). The first step was to implement an omnibus mediation analysis. Following previous methods, if the omnibus mediation effect is not significantly different from zero, the k-1 relative mediation effect is zero, where k reflects the number of profiles. Otherwise, the second step is applied, which involves conducting a relative mediation analysis that is aimed at determining the relative mediation effect. If the effect is significantly different from zero, then, the third step should be implemented. Otherwise, the mediation analysis is complete. In the third step, the relative direct effects are reported. Combining the characteristics and analysis results of achievement goal orientations profiles, we selected the average profile as the reference profile that was considered maladaptive (Tuominen-Soini et al., 2008), and the remaining profiles were compared with profile 3.

RESULTS

Preliminary Analyses

A previous study found that girls were superior to boys in achievement goal orientations, which indicated that girls possessed higher mastery-approach goals and lower performance-avoidance goals (Mouratidis et al., 2017). Male students are more performance-oriented than females (Butler, 2014; Yu and McLellan, 2019). Moreover, girls were more apt at engaging in learning than are boys (Li et al., 2011; Salmela-Aro and Upadaya, 2012; Wang and Eccles, 2012). From this, we controlled for sex for all data analyses. The relationships between all variables were analyzed using partial correlation analysis. Means, SDs, and zero-order correlations among variables are shown in **Table 1**. As shown in **Table 1**, mastery-avoidance goals did not correlate with learning engagement or academic adjustment; therefore, we excluded it from the mediation analysis of the variable-centered approach.

Latent Profile Analyses

Researchers classify the latent profiles and understand the proportion of people of the various categories throughout the group according to the answer mode on the individual external test topic, rather than determine the number of classifications *a priori*. LPA is particularly suitable for exploratory research questions and offers several advantages (Stern and Hertel, 2020). This probabilistic model-based classification method can not only guarantee the largest difference between the divided categories and the smallest difference within the categories but also can be measured by objective statistical indicators. As shown in **Table 2**, the AIC, BIC, aBIC, entropy, and LMR-LRT results for the different classes indicated that the five-class solution did not fit the data better than did the four-class solution; thus, we chose the four-class solution.

Figure 1 shows that the values for each variable were standardized scores per profile. Following the profile division method of achievement goal orientations used by Luo et al. (2011), we used a standardized score of 0.50 to divide and name the goals. We defined three levels: high (>0.50 SDs),

TABLE 1 | Means, standard deviations, and correlations ($n = 578$) of the core variables.

S. No.		1	2	3	4	5	6
1.	Mastery-approach goals	–					
2.	Mastery-avoidance goals	0.30***	–				
3.	Performance-approach goals	0.46***	0.38***	–			
4.	Performance-avoidance goals	0.02	0.33***	0.31***	–		
5.	Learning engagement	0.47***	0.03	0.17***	−0.12**	–	
6.	Academic adjustment	0.42***	−0.1	0.10*	−0.33***	0.43***	–
	M	3.51	3.65	3.48	2.69	4.25	3.38
	SD	0.58	0.71	0.69	0.87	1.07	0.46

*$p < 0.05$, **$p < 0.01$, and ***$p < 0.001$.

TABLE 2 | Model fit indices of the achievement goal orientations.

Model	AIC	BIC	aBIC	Entropy	LMR-LRT (*p*)	BLRT (*p*)
2-Class	6338.35	6395.02	6353.75	0.62	<0.001	<0.001
3-Class	6272.66	6351.13	6293.99	0.72	<0.01	<0.001
4-Class	6190.54	6290.81	6217.80	0.75	<0.01	<0.001
5-Class	6170.58	6292.65	6203.76	0.80	0.10	<0.001

average level (0.50–0.50 SDs), and low (<0.50 SDs). Profile 1 (11.61%) was characterized by low levels across all indicators of achievement goal orientations. We defined this class as low-motivation goals. Profile 2 (10.38%) included goals where scores of the two approach goals were both more than twice the 0.50 SD (the average level); the scores of the mastery-avoidance goals were contained within the average level, and performance-avoidance scores were sufficiently below the low level. We defined this class as approach-oriented goals. Profile 3 was the most prevalent (50.90%) and showed that the dimension scores of achievement goal orientations all fell within the average level. We defined this class as average goals. Profile 4 was the opposite of profile 1 and described 27.12% of the sample. This profile showed that mastery-approach goal scores were slightly below the high level, and the scores of the other three dimensions of achievement goal orientations were above the high level. We defined this class as multiple goals. Overall, LPA of achievement goal orientations revealed four groups: low-motivation (profile 1, 11.1%), approach-oriented (profile 2, 9.5%), average (profile 3, 52.8%), and multiple (profile 4, 26.6%).

To assess the validity of the classification of the profiles, we examined the association with the dimensions of achievement goal orientations using analyses of covariance. **Table 3** shows the means and SDs of each goal orientation.

Relationships Between Achievement Goal Orientations Profiles, Learning Engagement, and Academic Adjustment

Results showed that there were significant differences in learning engagement [$F(3,574) = 9.74$, $p < 0.001$, $\eta^2 = 0.05$] and academic adjustment [$F(3,574) = 27.26$, $p < 0.001$, $\eta^2 = 0.13$] between the achievement goal orientations profiles. As shown in **Table 3**, *post-hoc* Bonferroni tests found that profile 2 (approach-oriented goals) had the highest scores for learning engagement and academic adjustment, and the academic adjustment score of profile 1 was significantly higher than that of profiles 3 and 4. According to the results of ANOVAs and *post-hoc* comparisons analyses, approach-oriented approach had the highest score for academic adjustment, low-motivation goals had the second highest score, and the rest of two goals had the lowest scores that were not significant. In the score of learning engagement, approach-oriented goals had the highest score, the rest three goals had low scores and revealed no significant differences.

Mediation Analyses: Variable-Centered Approach

Because of the continuous variables, we used a simple mediation handler to test hypotheses 2 and 4 using the MEDIATE macro (Hayes and Scharkow, 2013). **Figure 2** shows that mastery-approach goals were positively correlated with learning engagement ($\beta = 0.88$, $p < 0.001$) and academic adjustment ($\beta = 0.34$, $p < 0.001$), performance-avoidance goals were negatively correlated with learning engagement ($\beta = -0.16$, $p = 0.001$) and academic adjustment ($\beta = -0.19$, $p < 0.001$), and performance-approach goals were not significantly correlated with learning engagement ($\beta = -0.02$, $p = 0.81$) or academic adjustment ($\beta = 0.01$, $p = 0.80$). In addition, learning engagement was positively correlated with academic adjustment ($\beta = 0.11$, $p < 0.001$).

Further statistical tests revealed that learning engagement mediated the relationship between mastery-approach goals and academic adjustment [indirect effect = 0.09, 95% confidence interval (CI) = (0.06, 0.14)]. The mediation effect accounted for 26.47% of the total effect. Learning engagement mediated the relationship between performance-avoidance goals and academic adjustment [indirect effect = −0.02, 95% CI = (−0.03, −0.01)]. The mediation effect accounted for 11.11% of the total effect. From these results, we can make the conclusion that learning engagement mediated the effects of the mastery-approach and performance-avoidance goals on academic adjustment.

Mediation Analyses: Person-Centered Approach

Because of the classified independent variable, the PROCESS macro in SPSS22.0 was used to analyze the mediation effect (Hayes, 2018). The omnibus mediation effects [$F(3, 573) = 27.08$,

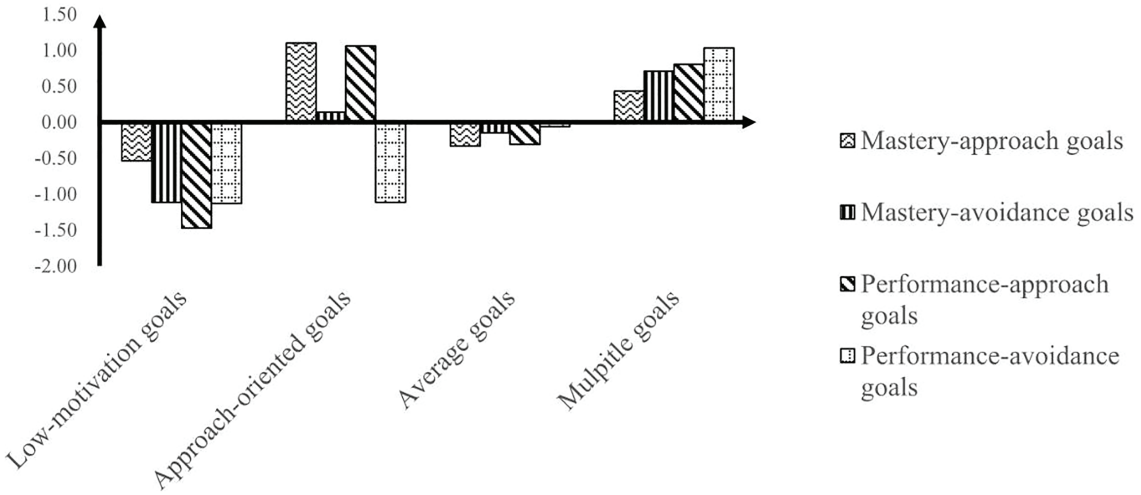

FIGURE 1 | The standardized mean scores on achievement goal orientations across four profiles.

TABLE 3 | Descriptive statistics (means ± standard deviations), MANOWA, and *post-hoc* analyses of the relationships between latent profile analysis membership, achievement goal orientations, learning engagement, and academic adjustment.

Profile	*N*	mastery-approach goals	mastery-avoidance goals	performance-approach goals	performance-avoidance goals	Learning engagement	Academic adjustment
Profile 1	64	3.20 ± 0.55	2.77 ± 0.68	2.40 ± 0.49	1.63 ± 0.48	4.14 ± 1.13	3.46 ± 0.45
Profile 2	55	4.20 ± 0.46	3.74 ± 0.77	4.28 ± 0.38	1.66 ± 0.48	4.98 ± 1.19	3.85 ± 0.50
Profile 3	305	3.32 ± 0.46	3.53 ± 0.57	3.26 ± 0.42	2.62 ± 0.57	4.19 ± 0.86	3.34 ± 0.40
Profile 4	154	3.78 ± 0.52	4.20 ± 0.47	4.07 ± 0.39	3.63 ± 0.51	4.17 ± 1.28	3.26 ± 0.46
$F(3,574)$		75.83***	99.04***	347.01***	311.38***	9.74***	27.26***
Bonferroni		1 = 3 < 4 < 2	1 < 3 = 2 < 4	1 < 3 < 4 < 2	1 = 2 < 3 < 4	1 = 3 = 4 < 2	3 = 4 < 1 < 2
Effects (η^2)		0.28	0.34	0.64	0.62	0.05	0.13

***$p < 0.001$.

$p < 0.001$] and the relative mediation effect [$F(3, 572) = 19.72$, $p < 0.001$] were significantly different from zero.

Results of the relative mediation analysis showed that low-motivation goals directly predicted academic adjustment. However, the mediation results were not significant because the CIs included zero. Therefore, they are not reported. However, the 95% bootstrap CIs (0.06, 0.19) of the relative mediation of approach-oriented goals excluded 0, which indicated that the relative mediation effect was significant ($a_1 = 0.75$, $b = 0.17$, $a_1b = 0.13$). That is, freshmen with approach-oriented goals had 0.75 times greater learning engagement level than those with approach-oriented goals ($a_1 = 0.75$), and their academic adjustment level also increased by 0.17 ($b = 0.17$) with learning engagement (**Figure 3**). The relative direct effect of approach-oriented goals was significant ($c'_1 = 0.39$, $p < 0.001$), which indicated that academic adjustment in students with approach-oriented goals was 0.39 higher than that of students with average goals. Moreover, the relative total effect was significant ($c_1 = 0.51$, $p < 0.001$), and the relative mediation effect a_1b was 25.49%. From these results, we can make the conclusion that learning engagement played a mediated role between approach-oriented goals and academic adjustment.

DISCUSSION

We investigated the relationships between achievement goal orientations and freshmen academic adjustment as well as the mediating role of learning engagement by combining variable- and person-centered analyses. Results revealed four potential profiles of achievement goal orientations. Learning engagement played a mediating role between two dimensions of achievement goal orientations (mastery-approach and performance-avoidance goals) and academic adjustment. The approach-oriented profile positively correlated with academic adjustment *via* learning engagement.

Achievement Goal Orientations Profiles

We explored the latent profiles of achievement goal orientations by conducting an LPA. Inconsistent with hypothesis 1, the LPA revealed four profiles of achievement goal orientations in freshmen: low-motivation, approach-oriented, average, and multiple. This inconsistency may be due to unknown factors that resulted in individual variations (Lo et al., 2017). The average profile had the

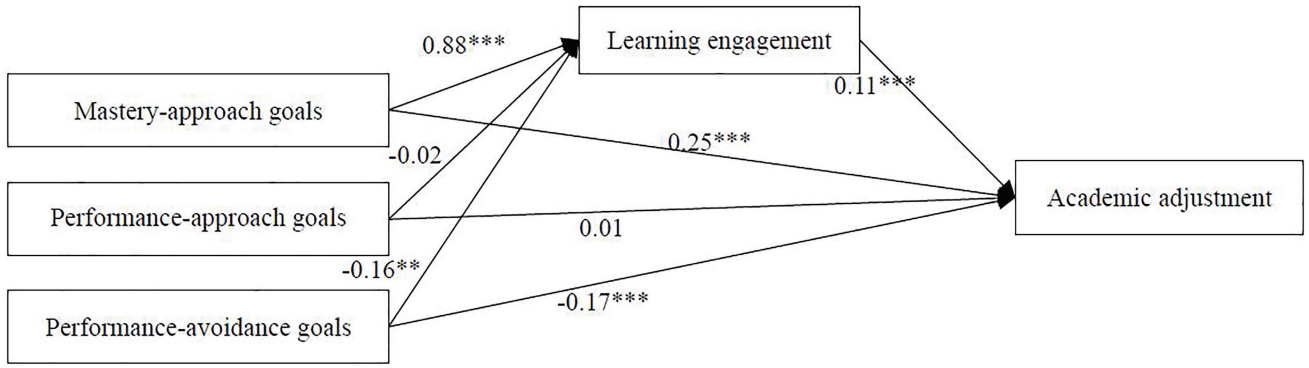

FIGURE 2 | The proposed mediated model on variable level. $^{**}p<0.01$, $^{***}p<0.001$.

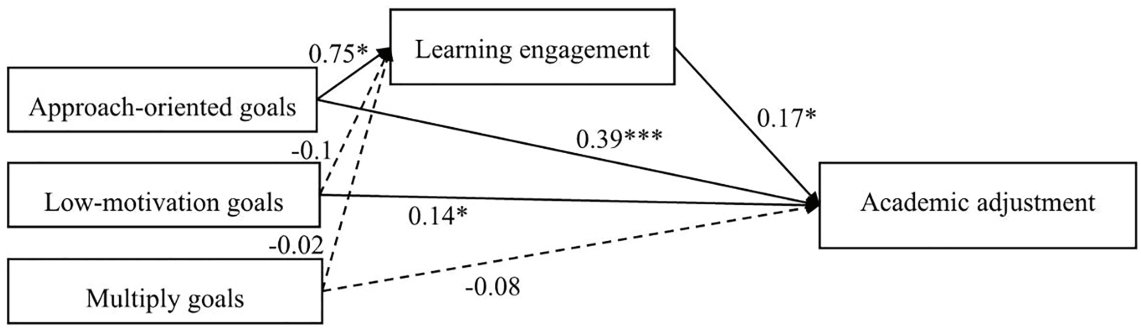

FIGURE 3 | The proposed mediated model on individual level. $^{*}p<0.05$, $^{***}p<0.001$.

highest number of freshmen (50.9%), and the approach-oriented students had the lowest number (10.4%). These results can be deceiving for the following three reasons. First, the cultural background of Chinese Confucian-collectivism emphasizes harmony and balance over individual achievement and is focused on the interconnectedness of everyone and everything (Gardiner et al., 2020). Second, students' hard work and mastery of knowledge are aimed at showcasing their talents or gaining recognition from external factors (e.g., parental expectations), which are likely to result in a lack of initiative. External factors may further increase students' fear of academic failure, which may cause them to refuse to pursue specific goals (Lin et al., 2003; Shih, 2008). Third, holding multiple goals is common in school because students may seek to follow personal interests and respond to external demands (Tuominen et al., 2020).

In addition, we revealed other achievement goal orientations profiles. Multiple profile students (27.1%) focused more on achieving better grades than other students and avoiding failure and mistakes. This profile emphasized not only learning and mastering knowledge in school but also achieving good grades and performing better than others. However, low-motivation profile students (11.6%) had relatively low scores across all dimensions of achievement goal orientations and did not focus on specific goals, such as mastering knowledge, performing better than others, or avoiding failure. Overall, these results indicated that different dimensions of achievement goal orientations can coexist in a student, and the variable-centered approach for exploring achievement goal orientations may lead to inappropriate conclusions (Ryan and Shim, 2006, 2008).

Relationship Between Achievement Goal Orientations and Academic Adjustment

In the current study, we tested the relationships between achievement goal orientations and academic adjustment, and the results partially supported our hypotheses. Specifically, mastery-approach goals positively predicted academic adjustment (hypothesis 2a), and performance-avoidance goals showed the opposite pattern (hypothesis 2b). These results support Dweck's (1986) point that an individual who has mastery-approach goals develops adaptive behavior, whereas one who has performance-avoidance goals mainly develops maladaptive behavior (Gillet et al., 2015).

However, performance-approach goals were negatively correlated with academic adjustment, which was contrary to hypothesis 2d. A possible explanation is that goal realization is brought about contrary results by the different self-determination reasons behind goals (Elliot and Murayama, 2008). For example, the autonomous reasons underlying performance-approach goals are closely related to the adaptive

results (e.g., persistence), whereas the control reasons underlying performance-approach goals are closely associated with maladaptive results (e.g., negative affect; Vansteenkiste et al., 2010). In the future, distinguishing achievement goals from achievement goal orientations and examining the underlying reasons for adopting and pursuing achievement goals is warranted.

Mastery-avoidance goals were shown to be unrelated to academic adjustment, which rejects hypothesis 2c. This may be because mastery-avoidance goals have both positive (emphasizing learning and striving toward goals that imply self-improvement and growth) and negative (avoiding failing) characteristics (Michou et al., 2016). The interaction between mastery-avoidance goals and outcomes depends on the characteristics of the individual that are more prominent (Elliot, 1999); therefore, the results are inconsistent. Another possible reason is that compared with freshmen, higher-grade students are more likely to experience or perceive some loss of skills or abilities with increasing grade due to the increasing amount of course content and difficulty. Therefore, it can be predicted academic adjustment more accurately in older students (de Lange et al., 2010; Senko and Freund, 2015).

From the person-centered approach, we found that students with approach-oriented goals had the highest scores for academic adjustment, and goals directly predicted academic adjustment. Results were concordant with hypothesis 3a and consistent with previous research by Tuominen-Soini et al. (2008). In addition, low-motivation goals directly predicted academic adjustment, whereas multiple goals did not. Notably, if scores of the approach-oriented goals are largely in line with (see low-motivation) or below (see multiple goals) scores of the avoidance-oriented goals, motivation-oriented goals may or may not positively predict academic adjustment. However, when approach-oriented goal total scores are higher than those of avoidance-oriented goals, it may predict higher academic adjustment (see approach-oriented goals). As mentioned in the Introduction, achievement goal orientations refer to the channels through which achievement-related motive dispositions manifest in students during specific achievement situations, and in the hierarchical model of achievement motivation (Elliot and Church, 1997; Elliot, 1999), motive dispositions reflect competence- and affect-based constructs that promote individuals to adopt achievement goals and orient them toward success (approach-oriented) or away from failure (avoidance-oriented) in specific achievement contexts and situations. Approach-oriented goals are focused on the constructive aspects of achievement, whereas avoidance-oriented goals are focused on the negative aspects (Job et al., 2009). Therefore, we can infer that regardless of the avoidance-oriented goals that the individual adopts, as long as it is accompanied by similar or a higher degree of approach-oriented goals, both motivation-oriented goals have a positive impact on the adaptation of the individual. Another notable finding is that individuals with mastery-approach goals perform better in predictive adaptation. It appeared that the adoption of these goals overcame any potential negative effects that were exerted by the other three goals (see motivation and approach goals). This may be because mastery-approach goals are primarily linked to a pattern of adaptive educational outcomes (Sommet and Elliot, 2017). An alternative reason is that students who possess mastery-approach goals have fewer negative psychological responses to wrong social comparisons (Kamarova et al., 2017). This study confirmed that mastery-approach goals are a remarkably powerful goal type (Shih, 2012) that considerably boosts academic adjustment.

Mediation of Learning Engagement

From the perspective of the variable-centered approach, we found that mastery-approach goals of freshmen increased learning engagement, which was positively related to academic adjustment, and performance-avoidance goals reduced learning engagement, which was negatively associated with academic adjustment. That is, learning engagement mediated the relationship between mastery-approach/performance-avoidance goals and academic adjustment. Therefore, why freshmen with different goal orientations are likely to explain different levels of academic adjustment can be explained by learning engagement. These findings support the integrative development-in-sociocultural-context model (Wang et al., 2019), which assumes that learning engagement is a pathway or process through which personal factors (e.g., motivational beliefs) shape learning outcomes.

In addition to the overall mediation result, we focused on a separate link within the mediation model. On the one hand, our findings support the notion that mastery-approach goals are related to increased academic adjustment and that performance-avoidance goals are the opposite of academic adjustment. Competence beliefs have been established as antecedents of engagement (Wang et al., 2019). This finding is consistent with the mindset theory, which posits that judgments of students regarding their performance have a significant influence on engagement (Weiner, 1985). Students who hold mastery-approach goals are likely to have higher learning engagement, whereas students with performance-avoidance goals will have lower learning engagement. On the other hand, we revealed that learning engagement was positively correlated with academic adjustment, which is consistent with previous studies that showed that learning engagement predicts academic achievement (Wang and Eccles, 2012), academic effort (Strauser et al., 2012), and better adaptation (Reschly and Christenson, 2012). Therefore, learning engagement may be used to assess the adjustment of freshmen in school and identify areas for intervention.

From the person-centered perspective, only approach-oriented goals increased learning engagement, which further increased academic adjustment. That is, learning engagement mediated the link between approach-oriented goals and academic adjustment. Emmons (1989) pointed out that for students, specific goals are important for adapting to the

current environment. People with clear achievement goals (approach-oriented) will be courageous enough to make effort, face problems, and adopt positive learning strategies. Our results are in line with Luo et al.'s (2011) study that demonstrated that approach-oriented students have more adaptive results for learning motivation (e.g., self-efficacy), learning engagement, and academic emotions [e.g., test anxiety (Luo et al., 2011; Lo et al., 2017)]. Moreover, students achieving goals facilitate meeting their internal needs, obtaining happiness (Job et al., 2009), and more easily adapting to the learning environment.

Limitations and Future Directions

Despite the theoretical and practical implications, the limitations of our work should be recognized. Firstly, we only tested freshmen, and thus, our results do not generalize across all students. In the future, studies should further consider the relationships between the dimensions and profiles of achievement goal orientations and academic adjustment in senior college students or primary and middle school students. Secondly, our study was based on a Chinese sample. The levels of achievement goal orientations vary between cultures. Therefore, students' achievement goal orientations should be compared between collectivism and individualism cultures to determine whether our findings generalize to other cultures. Thirdly, we did not observe a relationship between mastery-avoidance goals and outcomes, and the conclusions for mastery-avoidance and performance-approach goals were inconsistent. The reasons underlying these findings require further exploration, which may include investigations on autonomy and control, achievement motivation, and independent support, which will extend the achievement goal research field and offer future directions for research.

Implications

Our findings have both theoretical and practical implications. In terms of theoretical significance, we integrated variable-centered (concerning individual changes) and person-centered (concerning individual differences) approaches, which provided an important opportunity to advance the understanding of achievement goal orientations and demonstrated a comprehensive account of the influence factors and underlying mechanisms of academic adjustment. Furthermore, we provided further evidence of how academic adjustment is shaped. The person-centered approach allowed us to reveal different motivation patterns of freshmen and complemented the knowledge gained from traditional variable-centered quantitative methods for studying individual differences.

In regard to the practical implications, our findings highlighted the importance of mastery-approach and approach-oriented goals in promoting adaptive academic adjustment. Given the pivotal role of academic adjustment in student success (van Rooij et al., 2018), improving approach-oriented goals may help to increase academic adjustment in freshmen. It is essential for students to establish approach-oriented goals by accumulating experience by applying learning methods, such as inquiry-based learning, which is associated with goal orientations (Ramnarain and Ramaila, 2016). Moreover, by establishing a mediation model, our findings offer advice for practitioners to understand how achievement goal orientations are linked to academic adjustment. These findings may help in the development of appropriate educational practices. Freshmen who only have approach-oriented goals have greater learning engagement and academic adjustment; therefore, teachers should pay more attention to discovering potential at-risk groups and encourage them to explore their sense of competence to ensure that these students do not neglect their schooling. Furthermore, it is vital for teachers to reduce the emphasis on comparisons between students and minimize the negative impact of competitive environments.

CONCLUSION

Based on the 2×2 model of achievement goal orientations (Elliot and McGregor, 2001), we explored the dimensions and profiles of achievement goal orientations that influence academic adjustment and whether learning engagement mediates the relationship between achievement goal orientations and academic adjustment. We concluded that as: (1) Different from hypothesis 1, achievement goal orientations can be divided into four potential profiles: low-motivation, approach-oriented, average, and multiple; (2) learning engagement only mediates the relationship between the two goals (mastery-approach and performance-avoidance goals) and academic adjustment; (3) learning engagement mediates the relationship between approach-oriented goals and academic adjustment. Our findings have theoretical implications for future studies and practical implications for teachers to help develop the goals of students. Our results go beyond the previous studies by providing a depth understanding on how freshmen with differential achievement goal orientations performs academic adjustments. In addition, we highlight the importance role of learning engagement in the relationships between achievement goal orientations and academic adjustment.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Academic Ethics Committee of the College of Psychology of Northeast Normal University. Written informed consent from the participants' legal guardian/next of kin was

not required to participate in this study in accordance with the national legislation and the institutional requirements.

AUTHOR CONTRIBUTIONS

HW designed the research and acquired the funding. MX wrote the manuscript and recruited the participants. XX analyzed and interpretation of data for the work. YD and WW modified the manuscript. All authors listed have made a substantial, direct, and intellectual contribution to the work, and approved it for publication.

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REFERENCES

Aderi, M., Jdaitawi, M., Ishak, N. A., and Jdaitawi, F. (2013). The influence of demographic variables on university students' adjustment in North Jordan. *Int. Educ. Stud.* 6, 172–178. doi: 10.5539/ies.v6n2p172

Arjanggi, R., and Kusumaningsih, L. P. S. (2016). The correlation between social anxiety and academic adjustment among freshmen. *Procedia Soc. Behav. Sci.* 219, 104–107. doi: 10.1016/j.sbspro.2016.04.049

Auvinen, T., Hakulinen, L., and Malmi, L. (2015). Increasing students' awareness of their behavior in online learning environments with visualizations and achievement badges. *IEEE Trans. Learn. Technol.* 8, 261–273. doi: 10.1109/tlt.2015.2441718

Awad, A. M., AlAmodi, A. A., Shareef, M. A., Alsheikh, A. J., Mahmod, A. I., Daghistany, A. O., et al. (2014). The summer premedical program for matriculating medical students: a student-led initiative. *Adv. Physiol. Educ.* 38, 56–61. doi: 10.1152/advan.00085.2013

Baker, R. W., and Siryk, B. (1984). Measuring adjustment to college. *J. Couns. Psychol.* 31, 179–189. doi: 10.1037/0022-0167.31.2.179

Baranik, L. E., Stanley, L. J., Bynum, B. H., and Lance, C. E. (2010). Examining the construct validity of mastery-avoidance achievement goals: a meta-analysis. *Hum. Perform.* 23, 265–282. doi: 10.1080/08959285.2010.488463

Barashev, A., and Li, G. (2017). "Personal trait predicting work engagement in crowdsourcing through achievement goals: mediation analyses." in *Proceedings of the 8th International Conference on E-business, Management and Economics*, 28–32.

Bergman, L. R., and Trost, K. (2006). The person-oriented versus the variable-oriented approach: are they complementary, opposites, or exploring different worlds? *Merrill Palmer Q.* 52, 601–632. doi: 10.1353/mpq.2006.0023

Bipp, T., Kleingeld, A., and Schelp, L. (2021). Achievement goals and goal progress as drivers of work engagement. *Psychol. Rep.* 124, 2180–2202. doi: 10.1177/0033294120959778

Butler, R. (2014). "Motivation in educational contexts: Does gender matter?," in *Advances in child development and behavior, Vol. 47: The role of gender in educational contexts and outcomes*. eds. L. S. Liben and R. S. Bigler (San Diego: Elsevier Academic Press), 1–41.

Cheng, R. W. Y., and Lam, S. F. (2013). The interaction between social goals and self-construal on achievement motivation. *Contemp. Educ. Psychol.* 38, 136–148. doi: 10.1016/j.cedpsych.2013.01.001

Crede, M., and Niehorster, S. (2012). Adjustment to college as measured by the Student Adaptation to College Questionnaire: a quantitative review of its structure and relationships with correlates and consequences. *Educ. Psychol. Rev.* 24, 133–165. doi: 10.1007/s10648-011-9184-5

Daniels, L. M., Haynes, T. L., Stupnisky, R. H., Perry, R. P., Newall, N. E., and Pekrun, R. (2008). Individual differences in achievement goals: a longitudinal study of cognitive, emotional, and achievement outcomes. *Contemp. Educ. Psychol.* 33, 584–608. doi: 10.1016/j.cedpsych.2007.08.002

Darlow, V., Norvilitis, J. M., and Schuetze, P. (2017). The relationship between helicopter parenting and adjustment to college. *J. Child Fam. Stud.* 26, 2291–2298. doi: 10.1007/s10826-017-0751-3

Datu, J. A. D. (2018). Flourishing is associated with higher academic achievement and engagement in Filipino undergraduate and high school students. *J. Happiness Stud.* 19, 27–39. doi: 10.1007/s10902-016-9805-2

Daumiller, M., Rinas, R., Olden, D., and Dresel, M. (2021). Academics' motivations in professional training courses: effects on learning engagement and learning gains. *Int. J. Acad. Dev.* 26, 7–23. doi: 10.1080/1360144X.2020.1768396

de Lange, A. H., Van Yperen, N. W., Van der Heijden, B. I. J. M., and Bal, P. M. (2010). Dominant achievement goals of older workers and their relationship with motivation-related outcomes. *J. Vocat. Behav.* 77, 118–125. doi: 10.1016/j.jvb.2010.02.013

Dweck, C. S. (1986). Motivational processes affecting learning. *Am. Psychol.* 41, 1040–1048. doi: 10.1037/0003-066X.41.10.1040

Elliot, A. J. (1999). Approach and avoidance motivation and achievement goals. *Educ. Psychol.* 34, 169–189. doi: 10.1207/s15326985ep3403_3

Elliot, A. J., and Church, M. A. (1997). A hierarchical model of approach and avoidance achievement motivation. *J. Pers. Soc. Psychol.* 72, 218–232. doi: 10.1037/0022-3514.72.1.218

Elliot, A. J., and Harackiewicz, J. M. (1996). Approach and avoidance achievement goals and intrinsic motivation: a mediational analysis. *J. Pers. Soc. Psychol.* 70, 461–475. doi: 10.1037/0022-3514.70.3.461

Elliot, A. J., and McGregor, H. A. (2001). A 2 × 2 achievement goal framework. *J. Pers. Soc. Psychol.* 80, 501–519. doi: 10.1037/0022-3514.80.3.501

Elliot, A. J., and Murayama, K. (2008). On the measurement of achievement goals: critique, illustration, and application. *J. Educ. Psychol.* 100, 613–628. doi: 10.1037/0022-0663.100.3.613

Emmons, R. A. (1989). "The personal striving approach to personality" in *Goal Concepts in Personality and Social Psychology* ed. L. A. Pervin (Hillsdale, NJ: Erlbaum), 87–126.

Fang, L. T., Shi, K., and Zhang, F. H. (2008). Research on reliability and validity of Utrecht Work Engagement Scale-Student. *Chin. J. Clin. Psychol.* 16, 618–620.

Feng, T. Y., Su, T., Hu, X. W., and Li, H. (2006). The development of a test about learning adjustment of undergraduate. *Acta Psychol. Sin.* 5, 762–769.

García-Ros, R., Pérez-González, F., Tomás, J. M., and Fernández, I. (2018). The Schoolwork Engagement Inventory: factorial structure, measurement invariance by gender and educational level, and convergent validity in secondary education (12–18 years). *J. Psychoeduc. Assess.* 36, 588–603. doi: 10.1177/0734282916689235

Gardiner, G., Lee, D., Baranski, E., and Funder, D.International Situations Project (2020). Happiness around the world: a combined etic-emic approach across 63 countries. *PLoS One* 15:0242718. doi: 10.1371/journal.pone.0242718

Gillet, N., Lafreniere, M. A. K., Huyghebaert, T., and Fouquereau, E. (2015). Autonomous and controlled reasons underlying achievement goals: implications for the 3 × 2 achievement goal model in educational and work settings. *Motiv. Emot.* 39, 858–875. doi: 10.1007/s11031-015-9505-y

Gonçalves, T., Niemivirta, M., and Lemos, M. S. (2017). Identification of students' multiple achievement and social goal profiles and analysis of their stability and adaptability. *Learn. Individ. Differ.* 54, 149–159. doi: 10.1016/j.lindif.2017.01.019

Hayes, A. F. (2018). Partial, conditional, and moderated moderated mediation: quantification, inference, and interpretation. *Commun. Monogr.* 85, 4–40. doi: 10.1080/03637751.2017.1352100

Hayes, A. F., and Scharkow, M. (2013). The relative trustworthiness of inferential tests of the indirect effect in statistical mediation analysis: does method really matter? *Psychol. Sci.* 24, 1918–1927. doi: 10.1177/0956797613480187

Honicke, T., Broadbent, J., and Fuller-Tyszkiewicz, M. (2020). Learner self-efficacy, goal orientation, and academic achievement: exploring mediating

and moderating relationships. *High. Educ. Res. Dev.* 39, 689–703. doi: 10.1080/07294360.2019.1685941

Howell, A. J., and Watson, D. C. (2007). Procrastination: associations with achievement goal orientation and learning strategies. *Pers. Individ. Differ.* 43, 167–178. doi: 10.1016/j.paid.2006.11.017

Iacobucci, D. (2012). Mediation analysis and categorical variables: the final frontier. *J. Consum. Psychol.* 22, 582–594. doi: 10.1016/j.jcps.2012.03.006

Jansen In de Wal, J., Hornstra, L., Prins, F. J., Peetsma, T., and van der Veen, I. (2016). The prevalence, development and domain specificity of elementary school students' achievement goal profiles. *Educ. Psychol.* 36, 1300–1319. doi: 10.1080/01443410.2015.1035698

Job, V., Langens, T. A., and Brandstatter, V. (2009). Effects of achievement goal striving on well-being: the moderating role of the explicit achievement motive. *Personal. Soc. Psychol. Bull.* 35, 983–996. doi: 10.1177/0146167209336606

Kamarova, S., Chatzisarantis, N. L. D., Hagger, M. S., Lintunen, T., Hassandra, M., and Papaioannou, A. (2017). Effects of achievement goals on perceptions of competence in conditions of unfavourable social comparisons: the mastery goal advantage effect. *Br. J. Educ. Psychol.* 87, 630–646. doi: 10.1111/bjep.12168

Kaplan, A., and Maehr, M. L. (2007). The contributions and prospects of goal orientation theory. *Educ. Psychol. Rev.* 19, 141–184. doi: 10.1007/s10648-006-9012-5

Knief, U., and Forstmeier, W. (2018). Violating the normality assumption may be the lesser of two evils. *bioRxiv.* doi: 10.1101/498931, [Epub ahead of print]

Lanza, S. T., and Cooper, B. R. (2016). Latent class analysis for developmental research. *Child Dev. Perspect.* 10, 59–64. doi: 10.1111/cdep.12163

León, S. P., Augusto-Landa, J. M., and García-Martínez, I. (2021). Moderating factors in university students' self-evaluation for sustainability. *Sustainability* 13:4199. doi: 10.3390/su13084199

León, S. P., and García-Martínez, I. (2021). Impact of the provision of PowerPoint slides on learning. *Comput. Educ.* 173:104283. doi: 10.1016/j.compedu.2021.104283

Li, Y., Lynch, A. D., Kalvin, C., Liu, J., and Lerner, R. M. (2011). Peer relationships as a context for the development of school engagement during early adolescence. *Int. J. Behav. Dev.* 35, 329–342. doi: 10.1177/0165025411402578

Li, Y., Yao, C., Zeng, S., Wang, X., Lu, T., Li, C., et al. (2019). How social networking site addiction drives university students' academic achievement: the mediating role of learning engagement. *J. Pac. Rim Psychol.* 13:19. doi: 10.1017/prp.2019.12

Lin, Y. G., McKeachie, W. J., and Kim, Y. C. (2003). College student intrinsic and/or extrinsic motivation and learning. *Learn. Individ. Differ.* 13, 251–258. doi: 10.1016/S1041-6080(02)00092-4

Lindell, A. K., Killoren, S. E., and Campione-Barr, N. (2020). Parent-child relationship quality and emotional adjustment among college students: the role of parental financial support. *J. Soc. Pers. Relat.* doi: 10.1177/0265407520964870, [Epub ahead of print]

Linnenbrink-Garcia, L., and Wormington, S. V. (2019). "An integrative perspective for studying motivation in relation to engagement and learning," in *The Cambridge Handbook of Motivation and Learning* eds. K. A. Renninger and S. E. Hidi (Cambridge: Cambridge University Press), 739–758.

Liu, X. S. (2013). *Statistical Power Analysis for the Social and Behavioral Sciences: Basic and Advanced Techniques*. *1st Edn.* New York, NY: Routledge.

Liu, H. J., and Guo, D. J. (2003). A research of the relationship between pretest anxiety, achievement goal orientation and test performance. *Psychol. Dev. Educ.* 2, 64–68.

Liu, H., Yao, M., and Li, J. (2020). Chinese adolescents' achievement goal profiles and their relation to academic burnout, learning engagement, and test anxiety. *Learn. Individ. Differ.* 83–84:101945. doi: 10.1016/j.lindif.2020.101945

Lo, M. T., Chen, S. K., and Lin, S. S. J. (2017). Groups holding multiple achievement goals in the math classroom: profile stability and cognitive and affective outcomes. *Learn. Individ. Differ.* 57, 65–76. doi: 10.1016/j.lindif.2017.06.001

Luo, W., Paris, S. G., Hogan, D., and Luo, Z. (2011). Do performance goals promote learning? A pattern analysis of Singapore students' achievement goals. *Contemp. Educ. Psychol.* 36, 165–176. doi: 10.1016/j.cedpsych.2011.02.003

Meece, J. L., Anderman, E. M., and Anderman, L. H. (2006). Classroom goal structure, student motivation, and academic achievement. *Annu. Rev. Psychol.* 57, 487–503. doi: 10.1146/annurev.psych.56.091103.070258

Michou, A., Matos, L., Gargurevich, R., Gumus, B., and Herrera, D. (2016). Building on the enriched hierarchical model of achievement motivation: autonomous and controlling reasons underlying mastery goals. *Psychol. Belg.* 56, 269–287. doi: 10.5334/pb.281

Montgomery, S., Gregg, D. H., Somers, C. L., Pernice-Duca, F., Hoffman, A., and Beeghly, M. (2019). Intrapersonal variables associated with academic adjustment in United States college students. *Curr. Psychol.* 38, 40–49. doi: 10.1007/s12144-016-9533-0

Morrison, G. M., and Cosden, M. A. (1997). Risk, resilience, and adjustment of individuals with learning disabilities. *Learn. Disabil. Q.* 20, 43–60. doi: 10.2307/1511092

Mouratidis, A., Michou, A., Demircioglu, A. N., and Sayil, M. (2017). Different goals, different pathways to success: performance-approach goals as direct and mastery-approach goals as indirect predictors of grades in mathematics. *Learn. Individ. Differ.* 61, 127–135. doi: 10.1016/j.lindif.2017.11.017

Mouratidis, A., Vansteenkiste, M., Michou, A., and Lens, W. (2013). Perceived structure and achievement goals as predictors of students' self-regulated learning and affect and the mediating role of competence need satisfaction. *Learn. Individ. Differ.* 23, 179–186. doi: 10.1016/j.lindif.2012.09.001

Muthén, L. K., and Muthén, B. O. (1998–2015). *Mplus User's Guide*. *8th Edn*. Los Angeles, CA: Muthén & Muthén.

Nadon, L., Babenko, O., Chazan, D., and Daniels, L. M. (2020). Burning out before they start? An achievement goal theory perspective on medical and education students. *Soc. Psychol. Educ.* 23, 1055–1071. doi: 10.1007/s11218-020-09572-0

Nerstad, C. G. L., Caniels, M. C. J., Roberts, G. C., and Richardsen, A. M. (2020). Perceived motivational climates and employee energy: the mediating role of basic psychological needs. *Front. Psychol.* 11:1509. doi: 10.3389/fpsyg.2020.01509

Niemivirta, M. (2002). "Individual differences and developmental trends in motivation: integrating person-centered and variable-centered methods," in *Advances in Motivation and Achievement, Vol. 12*. eds. P. R. Pintrich and M. L. Maehr (Amsterdam: JAI Press), 241–275.

Nylund, K. L. (2007). Latent transition analysis: modeling extensions and an application to peer victimization. doctoral dissertation. Los Angeles, CA: University of California.

Peixoto, F., Monteiro, V., Mata, L., Sanches, C., Pipa, J., and Almeida, L. S. (2016). "To be or not to be retained … that's the question!" Retention, self-esteem, self-concept, achievement goals, and grades. *Front. Psychol.* 7:1550. doi: 10.3389/fpsyg.2016.01550

Pek, J., Wong, O., and Wong, A. (2018). How to address non-normality: a taxonomy of approaches, reviewed, and illustrated. *Front. Psychol.* 9:2104. doi: 10.3389/fpsyg.2018.02104

Pekrun, R., Elliot, A. J., and Maier, M. A. (2006). Achievement goals and discrete achievement emotions: a theoretical model and prospective test. *J. Educ. Psychol.* 98, 583–597. doi: 10.1037/0022-0663.98.3.583

Phan, H. P. (2016). Interrelations that foster learning: an investigation of two correlational studies. *Int. J. Psychol.* 51, 185–195. doi: 10.1002/ijop.12127

Poortvliet, P. M., Anseel, F., and Theuwis, F. (2015). Mastery-approach and mastery-avoidance goals and their relation with exhaustion and engagement at work: the roles of emotional and instrumental support. *Work Stress.* 29, 150–170. doi: 10.1080/02678373.2015.1031856

Poortvliet, P. M., and Perdeck, J. (2014). Mastery-approach goals and self-efficacy as predictors of burnout and work engagement: the adaptive role of team-member exchange quality. *Gedrag Organisatie* 27, 188–212.

Ramnarain, U. D., and Ramaila, S. (2016). The achievement goal orientations of South African first year university physics students. *Int. J. Sci. Math. Educ.* 14, S81–S105. doi: 10.1007/s10763-014-9590-5

Reschly, A. L., and Christenson, S. L. (2012). "Jingle, jangle, and conceptual haziness: evolution and future directions of the engagement construct," in *Handbook of Research on Student Engagement*. eds. S. L. Christenson, A. L. Reschly and C. Wylie (New York, NY: Springer), 3–19.

Ryan, A. M., and Shim, S. S. (2006). Social achievement goals: the nature and consequences of different orientations toward social competence. *Pers. Soc. Psychol. Bull.* 32, 1246–1263. doi: 10.1177/0146167206289345

Ryan, A. M., and Shim, S. S. (2008). An exploration of young adolescents' social achievement goals and social adjustment in middle school. *J. Educ. Psychol.* 100, 672–687. doi: 10.1037/0022-0663.100.3.672

Salmela-Aro, K., and Upadaya, K. (2012). The schoolwork engagement inventory: Energy, Dedication, and Absorption (EDA). *Eur. J. Psychol. Assess.* 28, 60–67. doi: 10.1027/1015-5759/a000091

Schaufeli, W. B., Martínez, I. M., Pinto, A. M., Salanova, M., and Barker, A. B. (2002). Burnout and engagement in university students a cross-national study. *J. Cross-Cult. Psychol.* 33, 464–481. doi: 10.1177/0022022102033005003

Senko, C., and Freund, A. M. (2015). Are mastery-avoidance achievement goals always detrimental? An adult development perspective. *Motiv. Emot.* 39, 477–488. doi: 10.1007/s11031-015-9474-1

Shih, S. S. (2008). The relation of self-determination and achievement goals to Taiwanese eighth graders' behavioral and emotional engagement in schoolwork. *Elem. School J.* 108, 313–334. doi: 10.1086/528974

Shih, S. S. (2012). An examination of academic burnout versus work engagement among Taiwanese adolescents. *J. Educ. Res.* 105, 286–298. doi: 10.1080/00220671.2011.629695

Skinner, E. A., and Pitzer, J. R. (2012). "Developmental dynamics of student engagement, coping, and everyday resilience," in *Handbook of Research on Student Engagement*. eds. S. L. Christenson, A. L. Reschly, and C. Wylie (New York, NY: Springer), 21–44.

Skinner, E. A., Pitzer, J. R., and Steele, J. S. (2016). Can student engagement serve as a motivational resource for academic coping, persistence, and learning during late elementary and early middle school? *Dev. Psychol.* 52, 2099–2117. doi: 10.1037/dev0000232

Sommet, N., and Elliot, A. J. (2017). Achievement goals, reasons for goal pursuit, and achievement goal complexes as predictors of beneficial outcomes: is the influence of goals reducible to reasons? *J. Educ. Psychol.* 109, 1141–1162. doi: 10.1037/edu0000199

Stern, M., and Hertel, S. (2020). Profiles of parents' beliefs about their child's intelligence and self-regulation: a latent profile analysis. *Front. Psychol.* 11:610262. doi: 10.3389/fpsyg.2020.610262

Strauser, D. R., O'Sullivan, D., and Wong, A. W. K. (2012). Work personality, work engagement, and academic effort in a group of college students. *J. Employ. Couns.* 49, 50–61. doi: 10.1002/j.2161-1920.2012.00006.x

Tapola, A., Jaakkola, T., and Niemivirta, M. (2014). The influence of achievement goal orientations and task concreteness on situational interest. *J. Exp. Bot.* 82, 455–479. doi: 10.1080/00220973.2013.813370

Tapola, A., and Niemivirta, M. (2008). The role of achievement goal orientations in students' perceptions of and preferences for classroom environment. *Br. J. Educ. Psychol.* 78, 291–312. doi: 10.1348/000709907X205272

Tian, L. L., Yu, T. T., and Huebner, E. S. (2017). Achievement goal orientations and adolescents' subjective well-being in school: the mediating roles of academic social comparison directions. *Front. Psychol.* 8:37. doi: 10.3389/fpsyg.2017.00037

Tuominen, H., Niemivirta, M., Lonka, K., and Salmela-Aro, K. (2020). Motivation across a transition: changes in achievement goal orientations and academic well-being from elementary to secondary school. *Learn. Individ. Differ.* 79:101854. doi: 10.1016/j.lindif.2020.101854

Tuominen-Soini, H., Salmela-Aro, K., and Niemivirta, M. (2008). Achievement goal orientations and subjective well-being: a person-centred analysis. *Learn. Instr.* 18, 251–266. doi: 10.1016/j.learninstruc.2007.05.003

Tuominen-Soini, H., Salmela-Aro, K., and Niemivirta, M. (2011). Stability and change in achievement goal orientations: a person-centered approach. *Contemp. Educ. Psychol.* 36, 82–100. doi: 10.1016/j.cedpsych.2010.08.002

Tuominen-Soini, H., Salmela-Aro, K., and Niemivirta, M. (2012). Achievement goal orientations and academic well-being across the transition to upper secondary education. *Learn. Individ. Differ.* 22, 290–305. doi: 10.1016/j.lindif.2012.01.002

Upadyaya, K., and Salmela-Aro, K. (2013). Development of school engagement in association with academic success and well-being in varying social contexts: a review of empirical research. *Eur. Psychol.* 18, 136–147. doi: 10.1027/1016-9040/a000143

van Dam, A., Noordzij, G., and Born, M. (2020). Social workers and recovery from stress. *J. Soc. Work.* 21, 999–1018. doi: 10.1177/1468017320911350

van Rooij, E. C. M., Jansen, E. P. W. A., and van de Grift, W. J. C. M. (2018). First-year university students' academic success: the importance of academic adjustment. *Eur. J. Psychol. Educ.* 33, 749–767. doi: 10.1007/s10212-017-0347-8

Van Yperen, N. W., Blaga, M., and Postmes, T. (2014). A meta-analysis of self-reported achievement goals and nonself-report performance across three achievement domains (work, sports, and education). *PLoS One* 9:e93594. doi: 10.1371/journal.pone.0093594

Van Yperen, N. W., Blaga, M., and Postmes, T. (2015). A meta-analysis of the impact of situationally induced achievement goals on task performance. *Hum. Perform.* 28, 165–182. doi: 10.1080/08959285.2015.1006772

Van Yperen, N. W., Elliot, A. J., and Anseel, F. (2009). The influence of mastery-avoidance goals on performance improvement. *Eur. J. Soc. Psychol.* 39, 932–943. doi: 10.1002/ejsp.590

Vansteenkiste, M., Smeets, S., Soenens, B., Lens, W., Matos, L., and Deci, E. L. (2010). Autonomous and controlled regulation of performance-approach goals: their relations to perfectionism and educational outcomes. *Motiv. Emot.* 34, 333–353. doi: 10.1007/s11031-010-9188-3

Vizoso, C., Rodriguez, C., and Arias-Gundin, O. (2018). Coping, academic engagement and performance in university students. *High. Educ. Res. Dev.* 37, 1515–1529. doi: 10.1080/07294360.2018.1504006

Wang, M.-T., Degol, J. L., and Henry, D. A. (2019). An integrative development-in-sociocultural-context model for children's engagement in learning. *Am. Psychol.* 74, 1086–1102. doi: 10.1037/amp0000522

Wang, M. T., and Eccles, J. S. (2012). Social support matters: longitudinal effects of social support on three dimensions of school engagement from middle to high school. *Child Dev.* 83, 877–895. doi: 10.1111/j.1467-8624.2012.01745.x

Wang, M.-T., and Eccles, J. S. (2013). School context, achievement motivation, and academic engagement: a longitudinal study of school engagement using a multidimensional perspective. *Learn. Instr.* 28, 12–23. doi: 10.1016/j.learninstruc.2013.04.002

Warren, M. T., Schonert-Reichl, K. A., Gill, R., Gadermann, A. M., and Oberle, E. (2021). Naturalistic development of trait mindfulness: a longitudinal examination of victimization and supportive relationships in early adolescence. *PLoS One* 16:e0250960. doi: 10.1371/journal.pone.0250960

Weiner, B. (1985). An attributional theory of achievement motivation and emotion. *Psychol. Rev.* 92, 548–573. doi: 10.1037/0033-295X.92.4.548

Wigfield, A., and Cambria, J. (2010). Students' achievement values, goal orientations, and interest: definitions, development, and relations to achievement outcomes. *Dev. Rev.* 30, 1–35. doi: 10.1016/j.dr.2009.12.001

Wormington, S. V., and Linnenbrink-Garcia, L. (2017). A new look at multiple goal pursuit: the promise of a person-centered approach. *Educ. Psychol. Rev.* 29, 407–445. doi: 10.1007/s10648-016-9358-2

Xiang, S. Y., Liu, Y., and Bai, L. (2017). Parenting styles and adolescents' school adjustment: investigating the mediating role of achievement goals within the 2 × 2 framework. *Front. Psychol.* 8:1809. doi: 10.3389/fpsyg.2017.01809

Xu, X., Xu, G., Liu, M., and Deng, C. (2020). Influence of parental academic involvement on the achievement goal orientations of high school students in China: a latent growth model study. *Br. J. Educ. Psychol.* 90, 700–718. doi: 10.1111/bjep.12326

Yu, J., and McLellan, R. (2019). Beyond academic achievement goals: the importance of social achievement goals in explaining gender differences in self-handicapping. *Learn. Individ. Differ.* 69, 33–44. doi: 10.1016/j.lindif.2018.11.010

Zhang, Y., Watermann, R., and Daniel, A. (2016). Are multiple goals in elementary students beneficial for their school achievement? A latent class analysis. *Learn. Individ. Differ.* 51, 100–110. doi: 10.1016/j.lindif.2016.08.023

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METHODS
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Primary School Teachers' Perception of Low Functioning Students: Validation of the EPREPADI-1 Scale

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This research contributes to the knowledge and understanding of some aspects of the professional practice of primary education teachers in the Region of Murcia (Spain), and its possible effect on the creation of situations of educational exclusion. For this purpose, an instrument called EPREPADI-1 (Scale of Perception of Primary Education Teachers on their Training and Professional Practice in relation to Pupils with Disabilities) has been developed. The design and structure of the instrument includes important aspects that seek to highlight teachers' views and knowledge of educational legislation (international, national and regional), their views on nomenclatures (such as those of persons with disabilities and inclusive education), as well as their assessment of the use of language of denial in relation to pupils with lower functional performance. Furthermore, after the statistical tests carried out for the validation of the scale (Kendall's W test and Cronbach's Alpha), values were obtained that give the instrument excellent validity and reliability (both for the group of experts and also for the pilot group), which is why its use and application is recommended.

Keywords: perception, functional performance, teachers, legislation, education

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INTRODUCTION

When the day comes when the only thing that I will be able to say about a person with a disability is what they have achieved in their life and not what they have not been able to achieve, it will be the moment when their reality will no longer be biased (either because their legs cannot walk, their eyes cannot see or their cognitive power is not fully developed - among many other circumstances). Undoubtedly, the last decade has been marked by social and political transformations that have advanced towards safeguarding the rights of these people (García, and Ariza, 1990; Echeíta and Duk Homad, 2008; Carbonell, 2013 and Cornejo, 2016); a clear example of this has been the ratification -by Spain in 2008- of the International Convention on the Rights of Persons with Disabilities (ONU, 2006). In this sense, throughout history, socio-political changes have been redefining -permanently- the life of those people who are in a situation of vulnerability due to having a low functional performance; and likewise, and with regard to this lower performance, all these people have been marked -chronologically- by numerous and very different conceptualisations (retarded, disabled, handicapped, person with disability or person with functional diversity, among others). From all these constructs, it is possible to observe the assertion of a culture biased by a disability vision which -without any doubt-associates the possible aspirations of these people with their state of health (medical-rehabilitative model), approaching that historical correspondence which understands that the better the health, the better the quality of life of the person, without taking into account the

position that the person himself may take before his life (fundamental aspect for the quality of the same, as explained by the World Health Organisation-WHO).

Therefore, it seems indisputable that—despite the significant progress made in the Spanish corpus juris—society continues to forge these power relations over those who have less functional performance, by imposing demands above the wishes of the person him/herself. This situation can be observed—for example—when it is considered that their life path is different because they have a lower functional performance, wanting to predict once again what is expected of them (Schalock et al., 1989). These power relationships built in the family environment, at school—or even among their friends—lead people with low functional performance to the loss or reduction of their capacity to act, so that it could be considered that these relationships are the creators—to a large extent—of the situations of disability that these people still suffer. From this perspective, rights such as, for example, the ontological freedom inherent to every human being and which Sen (2000) considers essential for an adequate quality of life -Velandia, 2016- would be subtracted. Furthermore, it is worth highlighting the vision that the philosopher Johannes Althusius (1,557–1,638) contributes to this view by stating that "the human being has the status of a person insofar as he enjoys rights (. . .)" (quoted by Molina (2017) p. 126). Under this understanding, a scenario is drawn where those who have a low functional performance are relegated to the shadow of others who decide for them (either the State -at the legislative level- or their legal guardians).

Parallel to this situation, society's attitude and perception of such people is linked to the concept of quality of life, as (Schalock and Verdugo, 2002) attest in their multimodal approach in which they cite eight dimensions of quality of life (emotional well-being, interpersonal relationships, material well-being, personal development, physical well-being, self-determination, social inclusion and rights). These categories show that in order for people to evolve in the aforementioned dimensions, they must be offered fundamental freedoms which, undeniably, are associated with the capacity to act and, therefore, the attitude and perception of the person is a determining factor for their personal, social and physical development, as well as for maintaining satisfactory interpersonal relationships, all of this with a view to inclusion and the full fulfilment of their rights. From this perspective, it is worth considering the relationship of this construct with the school context, because although the quality of life of an adult can be measured and verified through approaches such as the one presented by Schalock and Verdugo (2002) with numerous indicators (multidimensional scales focused on satisfaction, ethnographic approaches, discrepancy analysis, direct behavioural measures, social indicators, and self-assessment of the quality of life -Schalock, Verdugo et al., 2013, p.448), a child's quality of life is contingent on the power relations that adults exercise over him or her, and he or she would be subjugated by adults to the extent that his or her rights are not fulfilled. This is what happens - on numerous occasions - with children with low functional performance; for example, when they are transferred to special education centres with the lame (and unlawful) excuse that general education centres cannot offer them a decent educational response (either due to a shortage of resources, insufficient facilities, lack of teacher training, lack of redefinition of professional practices, etc.). These statements are widely denounced in the "Report of the investigation related to Spain under article 6 of the Optional Protocol carried out by the UN Committee (2017)", in which it is denounced that in Spain education -protected by article 24 of the CRPD-has an exclusionary and segregationist character, harming all students (regardless of their degree of functional performance). And this extreme has also been denounced by Illán and Molina (2003) when they state that Spanish educational legislation continues to be strongly committed to an outdated rehabilitative referent based on this medical model of disability.

From all of this, it is possible to glimpse a social group that is marginalised both in society (in general) with less social participation in political, economic and community life, and—more specifically—in education, maintaining ordinary and special schools, differentiated classrooms, different learning with little significance for their development in the labour market, etc. (Díaz, 2018; Monsalve, 2021). In this sense, it is essential to promote the transformation of the attitudes and perceptions that these students have socially; but it is also highly necessary to modify the teachers' vision of this fact, given that they are the first socialising agents in children's lives (Escudero, 2018). Teachers have been entrusted with the sweet mission of creating meaningful experiences for their students; that is why a positive attitude can lead to motivation and personal growth of students. Of course, it would be very different to maintain a submissive attitude that reaffirms inequalities due to functional diversity, which could—in any case—seriously affect the quality of life we are referring to. Therefore, the perception that teachers have of their students ends up being essential for their personal development (their training as human beings), and also for the position they adopt in their present and future lives (Molina, 2017; Álvarez, Díaz and Molina, 2021). Under these premises, a scale has been designed to determine the perception that teachers have of people with low functional performance, considering the possible link between the specific training received (at university) and their subsequent professional performance, as well as to analyse the extent to which the use of the language of denial has negative effects on students who are in a situation of disability. Furthermore, taking into consideration the social exclusion that has accompanied such people throughout human history (mainly due to the negative attitudes that low functional performance has aroused), it seems necessary to investigate the stereotypical perceptions of society towards people living with disabilities.

In this sense, the present study highlights the value of the creation of a scale of perception of primary education teachers about their training and professional practice in relation to pupils with disabilities (an instrument validated with the acronym EPREPADI-1). It is a scale based on four clearly defined thematic blocks: personal opinion about disability, knowledge about the rights recognised for pupils with disabilities, personal opinion about the professional teaching practice, and personal opinion about the semantics used in relation to the disability construct. All these categories have been developed based on the specialised literature on this subject (Molina, Vallejo and Illán,

2016; Molina, 2017; Álvarez, Díaz, et al., 2021), and for the purpose of collecting information on aspects such as the knowledge that teachers have regarding the content of current educational legislation (on quality education), their opinion on the construct of inclusive education and disability, the use (or not) of the language of denial, as well as the relationship between their perceptions of functional diversity and its subsequent transposition in their daily professional practice (as teachers).

Theoretical Framework

This study discusses students who are discriminated against on the grounds of functional diversity; and it does so with respect to two key conditioning factors. On the one hand, it discusses the knowledge that teachers have about educational legislation and the use that they make of it in their regular professional performance; and, on the other hand, it also submits to analysis the use of the language of denial that is given -by teachers-at school. In this sense, considering the teachers' perception as a fundamental element for the development of this scale, we have reflected -firstly- on the relevance that perception reaches in the research processes in social sciences, as well as on why and for what purpose this survey (EPREPADI-1) was designed, from which we intend to give consistency to the proper development of the research. In addition, with respect to this approach, the following lines will serve to present some brief considerations about the educational regulations governing inclusive education, describing—specifically—the articles referring to students with lower functional performance (the concept on which this perception scale is based). Subsequently, emphasis is also placed on the construct of the language of denial referred to in the last block of items of the questionnaire; and all of this, subject to the theoretical investigation of the specialised literature used for its design. There is no doubt that the construct of perception is known for its use both in the social sciences and in other disciplines (for example in sociology or anthropology, among others: Sabido, 2017; Lewkow, 2014). Under this view, polysemic readings have arisen, as the term perception continues to be understood from a single perspective and, occasionally, it has come to be used to describe social aspects or conceptual discussions that (according to specialists in the field—Molina, Corredeira and Vallejo, 2012) do not have a real link with perception, sometimes leading to results that are far removed from the purpose of the study. Following this same line of thought, Vargas (1994) defines perception as:

The cognitive process of consciousness, which consists of the recognition, interpretation and significance for the elaboration of judgements around the sensations obtained from the physical and social environment, in which other psychic processes intervene, among which are learning, memory and symbolisation (p. 48).

By virtue of these words, it can be confirmed that—during its use for scientific research—perception can (and should) come to reflect what people perceive about what they may be asked about. We cannot forget that these answers—in turn—are conditioned by what the subjects have experienced, learned and/or shared in the social environments in which they live. This shows that it is absolutely necessary for researchers to specify, specify or define both the questions to be asked (i.e., that they are adequately grounded with respect to the subject matter to be investigated), as well as -necessarily- to draw up both exclusion criteria for the sample and also a catalogue of questions from which it is possible to verify the degree of adjustment between what is designed and the reality of the sample group.

Precisely because of the importance of perception for social studies, authors such as Molina, Corredeira and Vallejo (2012) explain that social perception "is the process through which we try to know and understand others" (p. 952) and, therefore, it also serves to interpret the underlying causes of people's actions, i.e. why they act in one way or another. Likewise, as the purpose of the research is to find out the perception that teachers hold regarding their own professional practice, the scale designed is a type of survey developed following the theoretical indications for these scientific studies in the social sciences (Castro et al., 2016). By virtue of the specialised literature, having a representative number of the population, it will be possible to infer whether teachers in the Region of Murcia give due fulfilment to the exercise of their teaching work (at a general level). And—in a more particular way—it also allows us to inquire about the knowledge they have about the educational rights of children with less functional performance (referenced in the specific regulations on this matter—which they should obviously know and fully comply with), as well as to get into their opinion about their actions in the classroom (that is, about the exercise of their duties) and also in relation to the appropriate use of inclusive semantics and the legitimisation of this among their colleagues and the pupils as a whole.

Similarly, continuing with the contextualisation of the EPREPADI-1 scale, it is unavoidable to delve into some of the transformations that—in recent decades - have been taking place with respect to the international—and also national—corpus juris in the field of education (Molina, 2017; Álvarez, Díaz and Molina, 2021; Díaz, 2018). More specifically, on the regulations by virtue of which the care of students with lower functional performance is specified (transformations in the constructs that concern them, recognition of rights and duties, approval of resources for their inclusion in regular schools, etc.). Internationally, and since the approval of the CRPD (ONU, 2006), Spanish schools have been advocating a role in defence of the rights of people with disabilities (Parreño and de Araoz Sánchez Dopico, 2011). As we know, historically, the rights of these students have not been safeguarded by educational legislation (Molina, 2017) and, under this view, schools have faithfully followed what has been—capriciously—established by legislation, turning -undeniably- the passage of students with low functional performance into a series of situations of vulnerability (built on the assumption that these students are people with disabilities and that their condition is an impediment to learning). It also entails the generation of situations of exclusion, for example from those activities carried out in the classroom in which, while for the majority of the group there is a common objective and they carry out a single task, the student with less functional performance carries out a totally different task, and which -moreover- is erroneously justified from the -misunderstood- principle of individualisation of teaching. The current reality of all these students suffers from regulations, a school and professionals

who are still not able to offer an educational response adapted to their needs, and this is confirmed by the latest Report of the UN Committee -2017-, which also places special emphasis on this exclusion to which students with higher functional performance are subjected, since (through the maintenance of a parallel school, differentiated contents, learning standards, standardised assessment reports, special nomenclatures, etc.) they are only allowed -through the maintenance of a parallel school, differentiated contents, learning standards, standardised assessment reports, special nomenclatures, etc.) they are only allowed—in the best of cases—to cohabit in the same classroom under the pretence of complying with the principle of integration, but—certainly - denying them the possibility of sharing and protecting this (much-vaunted) educational inclusion every time they have to leave their classroom of reference, or when they are denied access to an ordinary education centre. Despite the approval of numerous national - and also EU—regulations, in Spain (apparently) full compliance with the right to quality education is not equally guaranteed for all students. This is probably because, regardless of the ratification of high-ranking regulations, the weight of cultural tradition (professional and administrative) is infinitely more powerful than the most impeccable of articles, especially if, together with the approval of the regulation, precautionary measures and protocols of action are not established for (obvious) future non-compliance (as happens, for example, with the job offer designed for these people Albarrán Lozano and Alonso González, 2010; Gutiérrez et al., 2020). On the other hand, when we look at some data provided by other research on the perception of teachers (Colmenero et al., 2019; Ruíz et al., 2019 -among others), we can see a biased opinion in which the administration is still given a large part of the responsibility (in this opinion), highlighting that -in general-teachers do not have sufficient capacity to act in favour of these students. This is also the case with the renowned lack of resources to respond to all pupils, with the (apparent) tyranny in the overload of tasks for teachers, with the unstoppable increase in the ratio per class, or with the insignificant number of specialist teachers (in hearing and language or therapeutic pedagogy), among others. But for some authors (Molina, 2017; Álvarez, et al., 2021), the absence or low availability of all these resources would not be as substantive as the improper use that could be made of such resources, exposing—in turn—the prevalence of issues of will over technical problems (Molina, 2017, p. 172). Therefore, a brief analysis of the regulatory situation in Spain shows a scenario in which its legislation includes a whole support structure for students with low functional performance, recognising attention to student diversity in all its preambles up to the specific articles dedicated to the education of these students (Art.o 71, 72 or 73 of the OLIEQ, for example), all of which are included in the latest educational laws passed in our country (Organic Law on Education 2/2006 -LOE-, 2006; Organic Law on Education 8/2013, 2013 for the Improvement of the Quality of Education -OLIEQ-, and the Organic Law that modifies Law 2/2006 -LOMLOE-). In this sense, the Region of Murcia is a proactive community in safeguarding the rights of all pupils, and by virtue of this it proposes various regulations to promote inclusion and foster the quality of life of these pupils. By way of example, Decree 359/2009 (which establishes and regulates the educational response to student diversity in the Autonomous Community of the Region of Murcia) and the Order of June 4, 2010 (which regulates the Plan for Attention to Diversity in public and subsidised private schools in the Region of Murcia) are examples of regulations in line with this defence of rights. These regulations arise from the express desire for teachers to have a legislative framework from which to act, protecting -also- the right to education of those who have a lower functional performance (i.e., moving away from the rehabilitative vision of legislation from the last century). The procedures to be followed by teachers have become a challenge for the Administration (with the development of regulations) and for universities (with the necessary updating of their training plans), as well as for all schools and their professionals (with a significant involvement in their ongoing training, and the consequent increase in an additional administrative burden). All of this, with the aim that their teaching practices do not become a scenario -only- full of good intentions. Undoubtedly, these laws are a result of the desire to include in schools all those issues regarding attention to diversity which, it seems (and year after year), continue to be of interest to jurists. Despite this, the modifications are so slight and empty of content (with minimal changes in nomenclature and the absence of procedures to be followed by teachers) that it could be said that inclusive education and educational quality remain a chimera. As proof of this, research such as that contained in the EPREPADI-1 scale takes on special relevance and prominence insofar as its aim is to respond to both students and teachers, insofar as it is not limited to providing—only-some (superficial) answers for students, but also attaches importance to the approach that teachers must have to what actions are necessary and how to carry them out within this new socio-educational scenario of inclusion (Palacios, 2020).

MATERIAL AND METHODS

Instrument (Scale EPREPADI-1)

Firstly, it should be noted that the EPREPADI-1 scale has been specifically designed and developed to find out to what extent the use of the so-called language of denial has negative effects on pupils with disabilities, and to what extent it may affect their emotional balance, as well as the possible construction of situations of social exclusion in different areas (educational, social, leisure, etc.). In the same way, it also makes it possible to describe the perception of primary education teachers in the Region of Murcia with regard to people with disabilities, analysing the possible relationships that may exist between the specific training received (initial and continuous) in the field of functional diversity and subsequent professional performance.

In this sense, the instrument developed for this research is structured according to four clearly defined thematic blocks (personal opinion on disability, knowledge of the rights recognised for students with disabilities, personal opinion on professional teaching practice, and personal opinion on the semantics used with respect to the disability construct). All these

categories have been designed taking into account the specialised literature (Molina, Corredeira and Vallejo, 2012; Molina, 2017; Álvarez, Díaz and Molina, 2021) and, above all, following the international, national and -particularly- Murcia Region educational regulations. The instrument is made up of sixty-four items, twelve of which are dedicated to the socio-demographic data of the participants (educational centre, type of centre, sex, age, qualifications studied, etc.); two questions dedicated to personal opinion on disability (through which qualitative information will be obtained). It also incorporates twenty-four questions (multiple choice and Likert-type) on knowledge of the rights of people with disabilities, together with another seventeen items referring to the teacher's own professional practice, which follow the same Likert-type scale that is maintained throughout practically the entire questionnaire (with the options totally correct, partially correct, not sure, partially correct, totally incorrect). Finally, the scale closes with seven questions aimed at finding out the teachers' opinion of the semantics used by teachers (including themselves) in relation to students with lower functional performance.

Method and Sample

The instrument developed is a perception scale subject to validation by a group of expert judges, as well as by a pilot group of professionals representative of the sample. Specifically, it has been developed to study the relationships and associations that exist between the different variables, as well as to make comparisons between the different participants in the study (primary school teachers in the Region of Murcia in the case of the EPREPADI-1 scale). According to the specialised literature (Galicia, Balderrama Trápaga and Edel, 2017), there are different formulas to validate questionnaires, in order to verify that the instrument accurately measures what is desired. In the case of this research work (which is of a non-experimental nature, dedicated -exclusively- to the validation of the EPREPADI-1 scale), a procedure has been followed in which (following Escobar and Cuervo, 2008; Boluarte and Tamari, 2017) the measurement of the validity of the content (on the one hand) and the reliability of the questionnaire (on the other) has been carried out, with the aim of optimising its subsequent applicability.

As shown in the previous image (**Figure 1**), and based on (Zamora et al., 2020), two phases were followed to develop the validation of the questionnaire (expert judgement, pilot group) from which the results obtained show the need to make some changes to optimise the scale. In this sense, for the development of the expert judgement phase, an ad hoc evaluation instrument was developed in which the participating judges had to provide descriptive information on their profile -as experts- (professional category, years of professional experience and current performance in management positions). For the evaluation of each of the items, four excluding criteria were defined: clarity, relevance, validity and pertinence. Thus, the experts had to evaluate each of the items of the scale according to these four criteria (previously defined) and in a range of 1–4 (1 being the lowest degree of agreement and 4 the highest degree of agreement), leaving room—also—for comments at any time. In addition, following the same scoring system, at the end of the questionnaire they were given the opportunity to make an overall assessment of the questionnaire. Once the judges' evaluations had been analysed, and in analogy to the procedure followed by Molina, Corredeira and Vallejo (2012), the criterion used for the retention or modification of an item was the agreement of at least 75% of the judges. After applying the improvements made by the group of experts, the pilot group phase was carried out in order to complete the reliability process of the instrument.

Instrument Validity

In the process of validating an instrument, expert judgement is a technique frequently used to ascertain the degree of agreement between judges and, based on their evaluations and observations, to contribute to the objectivity of the instrument designed for the collection of information (Bruna, et al., 2019; Hernández and Pascual, 2017) before its mass application. In this sense, the inter-judge assessment takes the form of the judgement made by a group of professionals knowledgeable in the subject matter to which the instrument submitted for assessment refers, so that they can contribute their interpretations and considerations regarding the following elements of the scale: semantics, content, structure, concreteness and appearance of the items (among other conditions -Zamora, Serrano and Martínez, 2020).

For this study, and taking into account that a purposive and non-probabilistic sample has been used (Escobar and Cuervo, 2008), the selection of the judges was carried out on the basis of their professional training with respect to the subject matter contained in the EPREPADI-1 survey, their current professional performance, as well as their willingness to join the evaluation process. In this sense, the designed assessment instrument was sent for possible participation to fifteen experts, including teachers, school principals, legal specialists and doctors of education. All of them were given the opportunity to respond within a period of 15 days, which was subsequently extended (for another 15 days) to allow for a greater degree of participation. The process ended after the collaboration of five experts, which meant a differential loss of 66.7% of the participants ($n = 10$). The final participants included a university lecturer (experienced in special education), three teachers (head teachers) and a university lecturer (specialist in civil law), all of them with more than 20 years of teaching experience. As indicated above, the judges had to make their estimation expressed in terms of the degree of agreement—or disagreement—with regard to the pre-established criteria for the evaluation. In this sense, the definition of each of the exclusion criteria was as follows:

- Clarity (CL): this criterion refers to whether the contribution is considered "clear", in the sense of having comprehensive, semantically correct and unambiguous wording.
- Relevance (RV): this criterion refers to whether the information input provided by the item under analysis is notable and/or distinctive for the purpose of the study (i.e. the item is—to a greater or lesser extent—relevant).
- Coherence (CH): this criterion refers to the adequacy of each item with the purpose of the research; we would then talk about whether the item is coherent with the nature or purpose of the study.
- Relevance (PT): this criterion refers to the degree to which each item, as it is written, is relevant to the research, in the

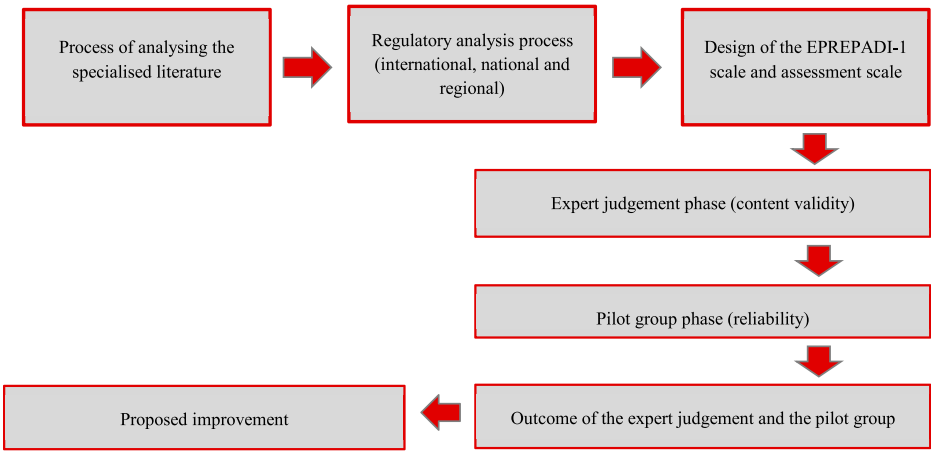


FIGURE 1 | Itinerary of the validation process of the EPREPADI-1 scale. Source: Own Elaboration

sense of whether it serves (to a greater or lesser extent) to achieve the proposed objective.

On the other hand, it is absolutely relevant to underline that the judges always responded individually and without any previous contact between them. Furthermore, Statiscal Product and Service Solutions (SPSS) version 24.0 was used for the reliability analysis. With regard to the tests carried out, descriptive statistics were calculated for each of the criteria evaluated (CL, RV, CH and PT), taking into account for the analysis -also- the opinions that the judges referred to regarding the title, instructions and general assessment of the design of the questionnaire. In turn, to test the hypothesis and the degree of inter-judge agreement, Kendall's (non-parametric) W test was used.

Instrument Reliability

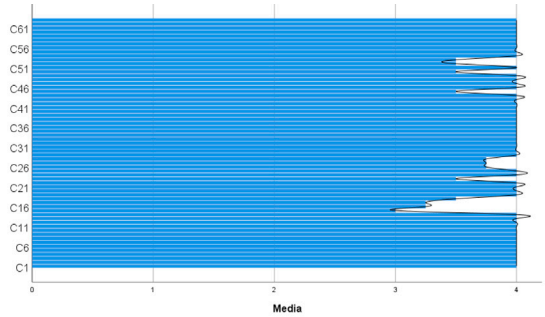
The analysis processes carried out to observe the reliability of the instruments used to collect information aim to ascertain the precision with which these instruments—in a real and consistent manner—measure what is desired. Generally, in all questionnaire validity processes, a distinction should be made between content validity and reliability, since the presence of one of these two values does not imply the obligatory presence of the other; in other words, a questionnaire may have a high reliability and yet not be able to measure what is desired. Following these criteria, for a survey to be considered suitable for the research process, it is absolutely necessary that it is both valid and that it has a high reliability index. Specifically, in the case of the EPREPADI-1 scale, the treatment of these data has been carried out in order to find out whether it is reliable in its prediction of the perception that primary school teachers have of students with lower functional performance (Santisteban, 2009; Barbero, 2010). As we know, if in reliability analyses the measurement values are arranged between the real value and the error range, an instrument will behave with greater reliability to the extent that its error value is minimised (Argibay, 2006; Martínez, et al., 2014). On this basis, the procedure to determine the reliability of the EPREPADI-1 survey has followed—as indicated in **Figure 1** two-phase process (expert judgement and pilot group); in both phases the Cronbach's alpha test was applied. This non-parametric test was carried out with the aim of assessing the internal consistency of the items (64) subjected to assessment, both by the experts and by the pilot group; that is, through this test it could be affirmed (or not) whether the construct is valid, provided that the items that make up the scale show a satisfactory correlation (which would indicate that the measures would be representative for that construct).

RESULTS

As a direct consequence of the validity process of the EPREPADI-1 survey, the descriptive statistics of the ratings provided by each of the experts (mean, standard deviation, minimum and maximum values and quartiles -first, second and third-) have been analysed according to the four criteria used for the judges' evaluation (clarity, relevance, coherence and pertinence). These calculations were also used for the evaluation of the title, instructions and design of the questionnaire. Similarly, in order to ascertain the robustness of the opinions provided by the experts, Kendall's (non-parametric) W test was carried out. This test allows us to ascertain the hypothesis of agreement between the judges and, therefore, to observe whether there is significant agreement between the assessments made by the experts (Siegel and Castellan, 1995), knowing that a value of 1 means total agreement and a value of 0 means total disagreement (Escobar and Cuervo, 2008).

By virtue of the analysis of the descriptive statistics, we observed those items whose values were close to the minimum value (values 1 and 2 being considered as a low level of satisfaction), and also those whose values were close to the maximum value (values 3 and 4 being considered as a high level of satisfaction). Thus, it can be confirmed that those items whose codes have been evaluated with a minimum value (between 1 and 2) and which also have a high standard deviation, maintain a greater variability among the experts' evaluations, and this is reflected—by way of example—in the following graph:

Graph 1. Mean of the Clarity Criterion.



Source: own elaboration based on Statiscal Product and Service Solutions (SPSS).

As can be seen from the data shown in the previous graph (**Graph 1**), the variability of the mean for the clarity criterion is greater in items C15, C16, C17, C18, C45, C50, C52 and C53; however, with the exception of items C15 and C17 (which have been rated by 40% of the experts below the levels of agreement), in no case can the variability of the standard deviation be considered significant, with all the experts showing agreement on this point. Similarly, descriptive statistical calculations have been carried out for the other criteria assessed by the judges—relevance, pertinence and coherence—without obtaining a significant standard deviation for any of the cases. This means that -for all these criteria-there has been a high level of satisfaction in the assessment of the items; the same has occurred with the rest of the items assessed (title, instructions and scale design), which have been evaluated by more than 75% of the judges with the maximum value of agreement (4).

In turn, the ordinal scale of Kendall's W coefficient of concordance was applied to determine the degree of concordance between the judges (k = 5); it should be noted that -for its analysis- the ranges indicated *ut supra* (when describing the test) were assigned, obtaining as a result for each of the criteria always values above the level of significance. This implies a statistically significant agreement between the experts or, in other words, that there is no significant difference between their answers.

Specifically, the data resulting from the test indicate that, although for the clarity criterion the level of asymptotic significance was 0.106 (which would determine that there may be ambiguity in the level of agreement between the items assessed for this criterion), this fact is duly explained by the lower score obtained for the two items indicated in the descriptive statistics. For their part, the rest of the criteria assessed by the judges have a moderate-high level of agreement, as the data obtained were 0.565 for the relevance criterion, 0.550 for the coherence criterion and 0.704 for the pertinence criterion (**Table 1**). In this regard, it is absolutely relevant to point out that the difference in agreement between the judges is also necessary to confirm that there is no agreed criterion for the classification of the items (Siegel and Castellan, 1995). Furthermore, as Escobar and Cuervo (2008) point out, it is very unlikely that the results will show extreme values (0–1), with a greater dispersion being the norm.

Likewise, in order to ascertain the degree to which the items of the EPREPADI-1 survey covary with each other (i.e. with the aim of measuring the internal consistency of the survey—its reliability), the Cronbach's Alpha coefficient test was carried out, The interpretation of the data obtained followed the criterion provided by George and Mallery (2003), according to which -as a guideline-an alpha coefficient below 0.5 would be unacceptable, and considered to be of good quality as of 0.7 (with values between 0.51 and 0.69 being considered questionable, depending on different variables). In the case of our scale, the result obtained would correspond to an excellent rating (α = 0.940) (**Table 2**); this means that the level of internal consistency is excellent and that, therefore, the items that make up the scale have a good correlation. Therefore, according to Celina and Campo-Arias (2005), it can be concluded that this scale is a valid construct (p. 574).

Evidently, within the process of validation and reliability of a questionnaire, biases can also appear that are marked by the subjective evaluations made by the experts. Thus, in addition to including the possibility for the judges to make their observations for each of the items and implicitly suggesting their redefinition if they so wish, in order to reduce this type of bias we have also considered the calculation and analysis of the results of a pilot test in which the participants (24 teachers from the Region of Murcia) were randomly selected from the different primary education centres in the region (to whom an e-mail was sent inviting them to participate in this research as primary education teachers). In this sense, taking as a reference the reliability data obtained with the Cronbach's Alpha coefficient test for the scale (by the experts' judgement), we proceeded to develop this same test with the data collected from the pilot group, thus providing - in this way—greater reliability to the instrument. As a consequence of this calculation, the excellent rating of the instrument (α = 0.863) was also reinforced, following the criteria of George and Mallery, 2003) (**Table 3**).

Thus, after analysing the statistical tests carried out, the internal consistency of the questionnaire was confirmed, as well as the validity and reliability of the scale. In this sense, the proposal for the modification of some items by the experts is detailed below:

After the redefinition of the items mentioned in the table (**Table 4**), based on the data studied from the pilot group as well as the confirmation -after the analysis of the expert judgement data- of the validity and reliability of the EPREPADI-1 scale, the reliability of the instrument is ratified with a highly satisfactory correlation and representative measures for the construct. In addition, and with the obvious reservations about generalisability that any pilot group entails (due to the limited representativeness for generalisation), the data extracted from the pilot group confirm the relevance of the problem under study, indicating that more than 60% of the respondents are unaware of the content of Article 24 of the CRPD (on the right to education); it is also very striking that 46% of the teachers surveyed acknowledge that they do not have (or are not sure they have) specific knowledge about educational regulations on the subject of attention to diversity. But it is equally worrying to know that more than 75% of the participants consider that the educational expectations that teachers have for their students with disabilities are not the same as those they have for the rest of their students. In short, the analysis shows that the content of the scale is fully representative for the research to be carried out. Similarly, it is important to highlight that -from a methodological point of view-this initial (validation) phase will continue with the subsequent implementation of the EPREPADI-1 survey to a

TABLE 1 | Kendall's W test results for CL, RV, CH and PT criteria.

Test statistics	
N	5
W de Kendall[a]	246
Chi-cuadrado	76,219
Gl	62
Sig. asintótic	106
Test statistics	
N	5
W de Kendall[a]	192
Chi-cuadrado	59,536
Gl	62
Sig. asintótica	562
Test statistics	
N	5
W de Kendall[a]	179
Chi-cuadrado	55,597
Gl	62
Sig. asintótica	704
Test statistics	
N	5
W de Kendall[a]	193
Chi-cuadrado	59,967
Gl	62
Sig. asintótica	550

[a]*Kendall's coefficient of concordance.*
Source: own elaboration based on Statiscal Product and Service Solutions (SPSS).

TABLE 2 | Cronbach's Alpha test results for the group of experts.

Reliability statistics	
Alfa de Cronbach	N de elementos
940	264

Source: own elaboration based on Statiscal Product and Service Solutions (SPSS).

TABLE 3 | Cronbach's Alpha test results for the pilot group.

Reliability statistics	
Alfa de Cronbach	N de elementos
863	45

Source: own elaboration based on Statiscal Product and Service Solutions (SPSS).

representative sample of primary school teachers in the Region of Murcia (Zamora et al., 2020).

DISCUSSION

It is obvious that administrative inefficiency and—consequently—the violation of people's rights, are linked to such revealing data as those recently denounced by the UN (2020), in which we are warned that a third of the world's population lives on one dollar a day, that every 5 seconds a child dies of malnutrition or that 263 million children between the ages of 6 and 16 are not in school. These data represent unquestionable challenges—at the global level—with which nations have to contend, but those who truly face the desert of administrative solitude are those who are directly affected, those who are denied the exercise of a recognised right, since the access to justice offered to them is an insurmountable barrier. On the basis of all these considerations (which have been used for the development of the scale submitted for validation), education and—therefore—the school are postulated as protagonists in the vital development of any student regardless of the high—or low—functional performance of each one. In this sense, the results expected from the massive application of the validated scale will prelude the beginning of a debate from which to review the situation of vulnerability and exclusion that students with low functional performance experience at school, as well as the participation—in this—of the Administration and teachers in the improvement of such extremes. In the same way, through this application it will be possible to represent the need to transform the school in order to provide -and not only promise-an education focused on the real needs of its students, their wishes and their own learning process in harmony with their personal growth.

Directly related to this fact, it is worth mentioning the Sustainable Development Goals, specifically the fourth goal of quality education, which states the need for all nations to achieve inclusive quality education for all. In this sense, for education to become inclusive, there must be a transformation in the understanding that still exists towards students who are discriminated against because of their functional performance, since it is not only a question of children with low functional performance sharing the classroom or common school spaces with the rest of the student body, Rather, it is absolutely necessary to carry out a paradigm shift in which the core training of teachers considers that it is just as important to transform their methodologies so that their students with lower functional performance can participate and learn, as it is for the rest of the students that they meet and share with these students who are in a situation of disability. In this way, it will be possible to eliminate some stigmas and social barriers that still hinder the fulfilment of numerous rights such as the right to education that all children have, and which—sadly—is affected by the lack of training of education professionals, the lack of full compliance with the regulations on the part of both educational centres and the educational administration itself, and -of course-by the importance of the historical trajectory that is still with us and that reveals a lack of understanding in the way of seeing low functional performance, since there is a vast majority of people (of course, also of education professionals) who do not distinguish between the need for an adaptation or support and their belief that these people will not be able to achieve or acquire the learning or skills that are proposed to them. In this perspective, educational regulations point out the need to transform this vision and also the professional practices clinging to the past, and likewise the specialised literature

TABLE 4 | Experts' proposal for the modification of items.

Original wording	Proposed modification	Final wording
Item 20: I have specific knowledge about specific articles of national education legislation concerning students with disabilities	Expert's proposal (E2): the specific articles do not matter, what matters is the knowledge of what the CRPD says	Final item: I have specific knowledge about the specific content of national education regulations concerning students with disabilities
Item 30: I have clear knowledge of the content of Article 24 of the CRPD concerning the right to education of persons with disabilities	Expert's proposal (E2): the number of the article matters little, what is relevant is its content	Final item: I have clear knowledge of the content of the CRPD regarding the right to education of persons with disabilities.)
Item 31: According to the CRPD, Article 24 states that Spain shall ensure a system of inclusive education at all levels and throughout the life cycle of learners	Expert's suggestion (E2): the number of the article matters little, what is relevant is its content	Final item: The CRPD states that Spain shall ensure a system of inclusive education at all levels and throughout the life cycle of students
Items 53: With regard to augmentative and alternative communication, disability awareness, as well as the design of educational techniques and materials to support pupils with disabilities, I consider that the administration is developing a fully adequate policy (compulsory training, professional incentives, course offerings, monitoring of compliance with regulations, etc.).	Expert's suggestion (E4): the wording of the item is very long	Definitive item: With regard to awareness-raising (art. 8 of the CRPD), I consider that the Administration is developing a totally adequate policy (compulsory training, professional incentives, courses offered, control of compliance with regulations, etc.).
	Expert suggestion (E4): some question related to EOEPS should be included	Final item: What is your knowledge of the EOEPS? (you can indicate several options)
Observations		
Expert E4 makes observations in relation to the content of items 17 and 18. Specifically, he points out that some of the curricular terminology described was obsolete; therefore, modifications are made to the different answer options, adapting them to the expert's description and the updated regulations		

Source: own elaboration based on data extracted from the rating scale.

(Molina, 2017; Álvarez, et. Al. 2021) mentions the transformation from that medical-rehabilitative paradigm that still interprets that people with lower functional performance have to be separated or even disregarded when it is not well known how to adapt the contexts for them, and calls for the evolution towards the paradigm of human rights, through which we are all equal before the full fulfilment of rights, emphasising the existence of diversity as the means to promote opportunities in all areas and, specifically, in the equitable development of learning. In this sense, the EPREPADI-1 scale will make it possible to know to what extent the training received by teachers, together with their social perceptions, can generate discriminatory situations at school for all pupils, understanding that the exclusion of these pupils implies indirect discrimination for pupils who are not in a situation of disability.

CONCLUSIONS

According to the results obtained after the validation of the EPREPADI-1 scale, the following conclusions can be highlighted:

1. Through the execution of the process of expert judgement, it has been possible to carry out the evaluation and assessment of the content which, together with the study analysis criteria (clarity, relevance, coherence and pertinence), the validation of the scale has been carried out, obtaining correct indices for the mass application of the scale to teachers.

2. It is also necessary to explain the relevance of the selection of the profile of the experts, the design of the instrument that has served to indicate their contributions (assessments and observations), as well as the development of the data analysis tests carried out, such as Kendall's W and Cronbach's Alpha, both of which are decisive for the validation of the scale.

3. The implementation of the pilot test, whose selection of participating teachers has also helped the validation process of the scale, by obtaining excellent indices in the results of the Cronbrach's Alpha test. In addition, this pilot test has allowed us to observe some findings that certainly confirm that the scale really measures what is desired for the research.

In this sense, from the tests carried out, this study shows results that indicate that the psychometric indices of the EPREPADI-1 scale are highly satisfactory in relation to the criteria already defined (clarity, relevance, coherence and pertinence). Moreover, once the concordance between the judges in their assessment for each of the items has been confirmed, it is confirmed that the survey presents a high validity and reliability for mass application. Undoubtedly, the results obtained with the application of the survey will make it possible to describe the main axes of transformation of that reality which, despite being in continuous evolution over the last 30 years, in Spanish society continues to show that marked instructive, memoristic, stereotyped and prejudiced character for those with a lower functional performance, as well as an excessive eagerness to preserve an (inherited) system that generates homogeneous beings and curtails talent, creativity and uniqueness (Molina, 2017; Etxeberria Mauleon, 2018).

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/Supplementary Material, further inquiries can be directed to the corresponding author.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the Comité de ética de la Universidad de Murcia. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

Conceptualization, YM and JS; methodology, YM; formal analysis, YM investigation, YM and JS; resources, JS; data curation, YM and JS; writing—original draft preparation, YM; writing—review and editing, YM and JS; visualization, YM and JS; supervision, JS; project administration, JS; funding acquisition, JS.

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REFERENCES

Albarrán-Lozano, I., and Alonso-González, P. (2010). Participación en el mercado laboral español de las personas con discapacidad y en situación de dependencia. *Papeles de población* 16 (64), 218–256.

Argibay, J. C. (2006). *Técnicas psicométricas. Cuestiones de validez y confiabilidad. Subjetividad y procesos cognitivos* 8, 15–33.

Barbero, M. I. (2010). *Psicometría (Teoría, Formulario Y Problemas Resueltos)*. Madrid: Sanz y Torres.

Carbonell, J. (2013). *La aventura de innovar: el cambio en la escuela*. Caracas: La aventura de innovar, 1–124.

Castro, L., Antonio Casas, J., Sánchez, S., Vallejos, V., and Zúñiga, D. (2016). Percepción de la calidad de vida en personas con discapacidad y su relación con la educación. *Estud. Pedagóg.* 42 (2), 39–49. doi:10.4067/s0718-07052016000200003

Colmenero, M.-J., Pegalajar, M.-C., and Pantoja, A. (2019). Teachers' perception of inclusive teaching practices for students with severe permanent disabilities/ Percepción del profesorado sobre prácticas docentes inclusivas en alumnado con discapacidades graves y permanentes. *Cultura y Educación* 31 (3), 542–575. doi:10.1080/11356405.2019.1630952

Díaz, E. (2018). *Ciudadanía, identidad y exclusión social de las personas con discapacidad*.

Echeíta, G., and Duk Homad, C. (2008). *Inclusión educativa.* REICE. Revista electrónica Iberoamericana sobre calidad, eficacia y cambio en educación 6 (2), 1–8.

Escudero, M. Z. (2018). *Subjetividades e identidades en deconstrucción: la escuela como agente socializador*. Antioquía (Bogotá).

Etxeberria Mauleon, X. (2018). Ética de la inclusión y personas con discapacidad intelectual. *Redis* 6 (1), 281–290. doi:10.5569/2340-5104.06.01.14

Galicia Alarcón, L. A., Balderrama Trápaga, J. A., and Edel Navarro, R. (2017). Content Validity by Experts Judgment: Proposal for a Virtual Tool. *Ap* 9 (2), 42–53. doi:10.32870/ap.v9n2.993

García, J. E., and Ariza, R. P. (1990). Cambio escolar y desarrollo profesional: un enfoque basado en la investigación en la escuela. *Investigación en la Escuela* (11), 25–37.

Gutiérrez, B., González, A., and Otero, A. (2020). Situación actual del empleo de las personas con discapacidad en España. *CIVINEDU* 2020, 669.

Illán, N., and Molina, J. (2003). *La Atención a la diversidad: perspectiva histórica y tendencias actuales*. Murcia: Universidad de Murcia (España).

Lewkow, L. (2014). Aspectos sociológicos del concepto de percepción en la teoría de sistemas sociales. *Revista Mad. Revista Del. Magister en Análisis Sistémico Aplicado A La Sociedad* 31, 29–45. doi:10.5354/0718-0527.2014.32957

Ley 8/2013 (2013). de 9 de diciembre, para la Mejora de la Calidad Educativa. *Boletín Oficial Del. Estado* 295, 3–64.

Ley Orgánica 2/2006 (2006). de 3 de mayo, de Educación. *Boletín Oficial Del. Estado* 106, 1–110.

Martínez, M. A., Hernández, M. J., and Hernández, M. V. (2014). *Psicometría*. Madrid: Alianza.

Molina, J. (2017). *La discapacidad empieza en tú mirada.Las situaciones de discriminación por motivo de diversidad funcional: escenario jurídico, social y educativo*. Madrid: Delta Publicaciones.

Monsalve, C. (2021). Diferencias Individuales, Equidad, Inclusión Educativa Y Ordenamiento Legislativo. *Transformación* 17 (1), 72–83. Recuperado a partir de. https://revistas.reduc.edu.cu/index.php/transformacion/article/view/e3476

ONU (2006). *Convención sobre los Derechos de las Personas con Discapacidad y Protocolo Facultativo*. Nueva York: ONU.

ONU (2013). *Estudio temático sobre el derecho de las personas con discapacidad a la educación*. España: Informe anual del Alto Comisionado de las Naciones Unidas.

Palacios, A. (2020). ¿Un nuevo modelo de derechos humanos de la discapacidad? Algunas reflexiones–ligeras brisas-frente al necesario impulso de una nueva ola del modelo social. *Revista Latinoamericana en Discapacidad, Sociedad y Derechos Humanos* 4 (2).

Parreño, M. J. A., and de Araoz Sánchez-Dopico, I. (2011). *El impacto de la Convención Internacional sobre los Derechos de las Personas con Discapacidad en la legislación educativa española*. España: CERMI.

Ruíz, M. J. C., Palomino, M. C. P., and Vallejo, A. P. (2019). Percepción del profesorado sobre prácticas docentes inclusivas en alumnado con discapacidades graves y permanentes. *Cultura y Educación: Cult. Educ.* 31 (3), 557–575.

Sabido, O. (2017). Georg Simmel y los sentidos: una sociología relacional de la percepción. *Revista mexicana de sociología* 79 (2), 373–400.

Santisteban, C. (2009). *Principios de psicometría*. Madrid: síntesis.

Schalock, R. L., Keith, K. D., Hoffman, K., and Karan, O. C. (1989). Quality of Life: Its Measurement and Use. *Ment. Retard.* 27 (1), 25–31. doi:10.1007/BF02578420

Schalock, R. L., and Verdugo, M. A. (2002). *Handbook on Quality of Life for Human Service Practitioners*. Washington, DC: American Association on Mental Retardation.

Sen, A. (2000). El Desarrollo Como Libertad Bogotá. *Gaceta ecológica* (55), 14–20.

Velandia, D. F. (2016). *El concepto de libertad en el enfoque de las capacidades de Amartya Sen*.

Verdugo, M. A., Schalock, R. L., Arias, B., Gómez, L. E., and Jordán de Urríes, B. (2013). Calidad de vida. *MA Verdugo & RL Schalock (Coords.). Discapacidad e inclusión Man. para la docencia*, 443–461.

Zamora-de-Ortiz, M. S., Serrano-Pastor, F. J., and Martínez-Segura, M. J. (2020). Validez de contenido del modelo didáctico P-VIRC (preguntar-ver, interpretar, recorrer, contar) mediante el juicio de expertos. *Form. Univ.* 13 (3), 43–54. doi:10.4067/s0718-50062020000300043

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Impact of Social Support Ecosystem on Academic Performance of Children From Low-Income Families: A Moderated Mediation Model

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This study conducted a questionnaire survey involving 513 children from low-income families (mean age = 13.25 ± 2.19 years) to explore the relationship between social support and academic performance as well as the mediating role of dispositional optimism and the moderating role of grit. A structural equation model analysis showed that: (1) social support has a significant positive predictive effect on academic performance and (2) dispositional optimism has a significant mediating effect on the relationship between social support and academic performance. Further, a moderated mediation effect test showed that grit moderates (3) the direct social support effect on academic performance as well as (4) the direct and indirect pathways among social support, dispositional optimism, and academic performance. The results indicate that social support is conducive to the development of dispositional optimism in children from low-income families, thereby improving their academic performance. At the same time, grit can enhance the positive impact of optimism on the academic performance of children from low-income families. This study has important theoretical and practical implications for effectively improving the academic performance of children from low-income families.

Keywords: social support, dispositional optimism, grit, academic performance, children from low-income families

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INTRODUCTION

The United Nations Children's Fund defines children living in poverty as those experiencing "deprivation of material, spiritual, and emotional resources needed to survive, develop, and thrive, leaving them unable to enjoy their rights, achieve their full potential, or participate as full and equal members of society" (Bellamy, 2005). China's contiguous impoverished regions host approximately 40 million children, whose level of development in health and education is significantly lower than the average level (China Children's Development Foundation, 2018). There is a proverb in Chinese, "all pursuits are of low value; only studying the books is high" (Yu and Suen, 2005). Chinese culture highlights greater educational attainment and academic performance as the main determinant of evenly distributed educational resources (Beaujean et al., 2011). However, children from low-income families have significantly inferior growth environments and development resources, compared to those from more advantaged families. Good academic performance is an important means for children from low-income families to achieve positive development and break the

intergenerational poverty cycle (Yoshikawa et al., 2012). However, owing to the burdens of poverty, parents are unable to devote adequate resources to their children's upbringing, which causes such children to fall behind in their cognitive development, executive functioning, and academic performance, compared to their peers from more advantaged backgrounds (Hair et al., 2015). Based on the main effect model of social support, we see that social support generally benefits individuals' physiological and psychological process of adapting; it can help individuals resist stress and obtain positive development outcomes (Cohen and Wills, 1985). Both individual and socio-environmental factors impact academic performance (Lee and Shute, 2010). Therefore, this study aims to explore how social factors (social support) and individual factors (dispositional optimism and grit) impact the academic performance of children from low-income families. We hope that this will provide the much needed theoretical basis and empirical support for optimizing their academic performance.

Social Support Impact on Academic Performance of Children From Low-Income Families

Social support refers to the perceived respect, care, and assistance that a person gains from the social relationships with individuals around them (such as family, friends, and significant others). Social support plays an important role in promoting and maintaining physical and mental health by eliminating or reducing the negative impact of stressful events on individuals (Alloway and Bebbington, 1987). Existing studies have inconsistent views of and conclusions on the impact of social support on the academic performance of children from low-income families. On the one hand, based on the buffering effect model, social support is seen as an important protective resource for individuals facing high-risk or high-stress events (Miloseva et al., 2017). Previous studies have also shown that high levels of social support can positively predict the academic performance of children from families with low socioeconomic statuses (Vasquez et al., 2016).

According to Lerner's (Lerner and Hood, 1986) developmental contextualism, individual and external environments interact, and personal factors are the closest factors affecting children's academic performance. The effect of social support on individuals is indirectly affected by individual internal psychological variables (McAdams and Olson, 2010). Based on the self-esteem threat model, social support implies a relationship of inequity between the donor and recipient of aid, which means that acceptance of aid conflicts with values of self-reliance and independence; thus, social support threatens the recipient's self-worth (Fisher et al., 1982). Moreover, for children from low-income families, continuous high social support levels may cause inertia in the positive perception of their disadvantaged situations, which may hinder their pursuit of academic excellence (Bolger and Amarel, 2007). Previous studies lack in-depth research on the mediating and moderating variables in the above relationship. Therefore, it is necessary to explore the internal mechanisms through which social support impacts the academic performance of children from low-income families.

The Mediating Role of Dispositional Optimism

Dispositional optimism, which is an important psychological resource, is a long-term, cross-scenario, and stable dispositional tendency to expect good results in the future (Scheier et al., 1986). The conservation of resources theory (COR) states that, when faced with loss of resources, individuals will mobilize resources to cope (Hobfoll, 1989).

According to the COR theory, optimism may be an important manifestation of the mobilization of internal resources by individuals (Alarcon et al., 2013). Children from low-income families have high internal heterogeneity, and some nevertheless possess positive mental abilities (Lever et al., 2005).

Previous studies have found that optimistic individuals often adopt active coping styles when faced with problems and can seek support from a wide range of social networks (Alloway and Bebbington, 1987; Brissette et al., 2002). The positive response, due to optimism, helps children from low-income families maintain positive and optimistic attitudes when faced with pressures and challenges. Moreover, highly optimistic children can view difficulties and setbacks positively and buffer negative learning experiences (Smith and Hoy, 2015).

Previous studies have shown that better social support can effectively enhance an individual's internal resources (Schöllgen et al., 2011). Therefore, optimism is likely to be the proximal factor that social support has on individual behavior. Siu et al. (2014) found that individuals' optimistic personality traits are closely related to their academic achievements and can stimulate students' intrinsic learning motivations. Hence, we chose optimism as a possible mediating variable between social support and academic performance.

The Moderating Role of Grit

Grit is a non-cognitive ability to persist and remain passionate toward long-term goals, which can motivate individuals to work hard and stick to these goals (Duckworth et al., 2007). Previous studies on academic performance have found that different achievement levels among individuals with equivalent intelligence levels are largely due to their unique grit levels (Duckworth et al., 2007).

Empirical studies have found that individuals with high grit levels can inhibit spontaneous distractions, thereby positively influencing their academic performance (Roux et al., 2015; Liu and Gao, 2020), while individuals with low grit levels use avoidance strategies (such as rejection and giving up), which in turn gives rise to negative expectations toward their future studies (Mosanya, 2019).

However, compared with children from more advantaged families, children from low-income families face more pressure and negative life events. Faced with constantly scarce external resources, children from low-income families need to develop more psychological resources to cope with difficulties (Roux et al., 2015). Kundu (2017) revealed that children from

low-income families have greater grit than children from more advantaged families do. Individuals with high grit levels are more persistent and focused when accomplishing long-term learning goals, leading to excellent academic performance.

Previous studies have found that both grit and dispositional optimism can be used as positive individual psychological capital, enabling individuals to have constructive emotional experiences and good quality of will in their studies (Luthans et al., 2006). Therefore, this study proposes that social support affects the academic performance of low-income families through the indirect effect of optimism, and it is speculated that this mediating pathway may be regulated by grit.

THE PRESENT STUDY

In short, focusing on children from low-income families, this study seeks to explore how external resources (social support) and internal resources (grit and dispositional optimism) impact these children's' academic performance. The study proposes the following hypotheses: (1) social support significantly and positively predicts the academic performance of children from low-income families; (2) dispositional optimism mediates between social support and the academic performance of children from low-income families; (3) grit plays a regulating role in the direct and indirect effect pathways of "social support → dispositional optimism → academic performance." We made use of these hypotheses to build a moderated mediation model which can be seen in **Figure 1**.

MATERIALS AND METHODS

Participants

The current study used convenience sampling (Creswell, 2007) to select children from nine primary and secondary schools in Hunan Province. The participants were all children from families registered as poverty-stricken, which is the local government's term for students coming from low-income families, with the family's monthly income being below 3,000 RMB. Moreover, all of them were required to register poverty according to local standards. With the informed consent of the school, parents, and students, the school screened for students who could fill in the study questionnaires. A total of 527 children (mean age of 13.25 years, standard deviation 2.19) participated in the survey and completed the questionnaires. The number of valid questionnaires collected was 513, with an effective rate of 97.3%; the participants comprised 192 boys (37.5%) and 321 girls (62.5%).

Measures

Social Support

A version of the Child and Adolescent Social Support Rating Scale (CASSS), compiled by Malecki and Demaray (2002) and revised for use in China (Ye and Dai, 2008), was employed in our study. It included 16 items covering three dimensions: subjective support (five items), objective support (six items), and support utilization (five items), graded on a scale of 1 to 5. The sum of all the items' scores is the total score of the scale, which reflects the overall state of the participant's social support. The higher the score, the higher the child's social support level. The Cronbach's alpha for the social support scale in this study was 0.81.

Academic Performance

The participants' final grades for Chinese, Mathematics, and English were selected as indicators for measuring academic performance. In addition, based on their grades, each participant's scores were standardized, and the standardized scores of the three subjects were added to obtain the total academic score.

Dispositional Optimism

Disposition optimism was measured by the Life Orientation Questionnaire-Revised (LOT-R; Scheier et al., 1994) which includes the two dimensions of optimism and pessimism. The Chinese version of the questionnaire has been proved to have good validity and reliability (Li et al., 2013). A 5-point rating scale was used. The questionnaire included six questions; with questions 1, 3, and 6 testing optimistic expectations, and questions 2, 4, and 5 testing pessimistic expectations. After reverse-coding questions 2, 4, and 5, all items were added to obtain a total score for dispositional optimism. A higher total score indicates that an individual has positive expectations for the future. The Cronbach's alpha in this study was 0.78.

Grit

This study used the revised Chinese version of the Grit-Short scale compiled by Duckworth and Quinn (2009), which included eight items graded on a 5-point rating scale. Among them, questions 1, 3, 5, and 6 were reverse-coded. A higher total score indicates stronger perseverance and tenacity. The Cronbach's alpha for the scale in this study was 0.79.

Data Analysis

This study used SPSS 22.0 and PROCESS macro for data processing. The steps involved in the analysis were as follows: (1) Tested the common-method variance and multicollinearity of this study; (2) Compiled descriptive statistics and performed correlation analysis on the variables; and (3) Incorporated gender and age as control variables during the analysis of mediation and moderating effects. Using the structural equation-based mediation and adjustment analysis procedure proposed by Wen and Ye (2014), the study tested the dispositional optimism and grit mediation and moderation effects on the relationship between social support and academic performance.

Ethics Statement

The study was reviewed and approved by the Ethics Committees of College of Education, Hunan Agricultural University. The study obtained written informed consent to participate in this study from the participants' legal guardian/next of kin.

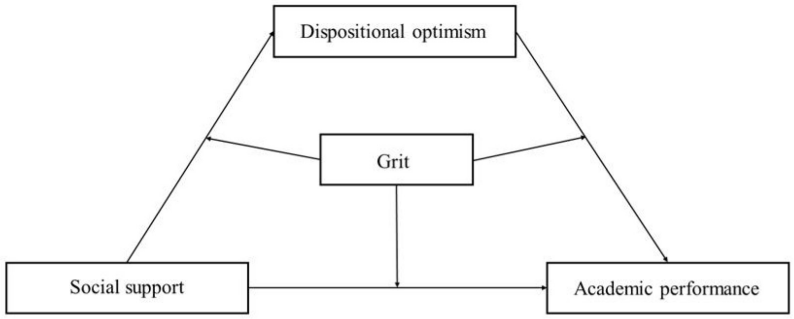

FIGURE 1 | Hypothesized model.

RESULTS

Common-Method Variance and Multicollinearity Test

An unrotated exploratory factor analysis was performed on all variables, using Harman's single-factor test (Zhou and Long, 2004). The results indicated that eight factors had characteristic roots greater than one. The variance explained by the first factor was 27.35%, which was lower than the critical value of 40%, indicating that the data have no obvious common-method variance issue. There was a significant correlation between the variables, which may indicate multicollinearity. Therefore, the predictor variables in each equation were standardized (Z score) and collinearity diagnostics were performed. The results indicated that the variance inflation factor for all predictors ranged from 1.15 to 1.24, with a tolerance greater than 0.1. Therefore, it was found that the data had no serious collinearity problem and were thus suitable for further testing.

Descriptive Statistics and Correlation Analysis for Each Variable

Table 1 lists the mean, standard deviation, and correlation matrix for each variable. As can be seen, the correlation analysis results indicate that gender, age, social support, academic performance, dispositional optimism, and grit are all correlated significantly and positively, meeting the conditions for the moderation effect test (Wen and Ye, 2014). In addition, gender, social support ($t = 3.26$, $p < 0.01$), and academic performance ($t = 3.25$, $p < 0.01$) are all significantly correlated. We also found a significant correlation between age and social support ($t = 3.87$, $p < 0.001$), academic performance ($t = -2.84$, $p < 0.01$), and grit ($t = 2.82$, $p < 0.01$). Therefore, gender and age were used as control variables in subsequent analyses.

Testing the Moderated Mediation Model

With gender and age as control variables, the PROCESS macro was used to test the moderated mediation model. The results in **Table 2** indicate that social support positively predicts academic performance. The total effect is significant, thus verifying Hypothesis 1. When mediating variables and moderator variables were included, the direct effect of social support on academic performance was not significant; however, social support was found to have had a significant positive predictive effect on temperamental optimism, and temperamental optimism was found to have had a significant positive predictive effect on academic performance. This shows that dispositional optimism plays a mediating role in the social support influence on academic performance, thus verifying Hypothesis 2.

In addition, the interaction term between social support and grit has a significant predictive effect on dispositional optimism, indicating that grit moderates the social support influence on dispositional optimism. In other words, grit moderates the first half of the mediation model. Meanwhile, the interaction term between dispositional optimism and grit has a significant predictive effect on academic performance, which indicates that grit moderates the influence of temperamental optimism on academic performance. In other words, grit adjusts the second half of the mediation model: the interaction between social support and grit has a significant predictive effect on academic performance. This indicates that grit moderates the direct pathway between social support and academic performance, which verifies Hypothesis 3.

To analyze the trends in its moderating effect further, the aspect of grit was divided into two groups (high and low) to examine its simple effects. The moderating effect of grit on social support and academic performance is shown in **Figure 2**. Increasing social support levels had no significant impact on the academic performance of children from low-income families with low grit levels ($\beta = 0.02$, $t = 0.14$, $p > 0.05$). For children with high grit levels from low-income families, academic performance rapidly increased with an increase in social support levels ($\beta = 0.40$, $t = 2.49$, $p < 0.05$).

The moderating effect of grit on social support and dispositional optimism is shown in **Figure 3**. The results indicate that, for children from low-income families with high and low grit levels, higher levels of social support have a certain impact on promoting dispositional optimism ($\beta = 0.21$, $t = 3.70$, $p < 0.001$; $\beta = 0.39$, $t = 6.91$, $p < 0.001$).

The moderating effect of grit on dispositional optimism and academic performance is shown in **Figure 4**. For children from low-income families with low grit levels, academic performance increased significantly with increased levels of dispositional optimism ($\beta = 0.61$, $t = 3.51$, $p < 0.001$). For children from

TABLE 1 | Descriptive statistics and correlation matrix for each variable (n = 513).

	M ± SD	1	2	3	4	5	6
Gender	0.62 ± 0.48	–					
Age	13.25 ± 2.19	−0.05	–				
Grit	27.15 ± 4.65	−0.04	−0.10*	–			
Dispositional optimism	21.67 ± 3.50	0.02	−0.01	0.33**	–		
Academic performance	0.00 ± 2.52	0.14**	−0.22**	0.20**	0.21**	–	
Social support	61.25 ± 12.34	0.14**	0.18**	0.27**	0.36**	0.13**	–

*Gender is a dummy variable (0 = male, 1 = female). * $p < 0.05$,** $p < 0.01$,*** $p < 0.001$ (same as below).*

TABLE 2 | Moderated mediation effect test of social support on academic achievement.

	Equation 1 (dependent variable: academic performance)			Equation 2 (dependent variable: dispositional optimism)			Equation 3 (dependent variable: academic performance)		
	β	*t*	*95% CI*	β	*t*	*95% CI*	β	*t*	*95% CI*
Gender	0.10	2.50	0.12, 0.99	−0.02	−0.31	−0.18, 0.13	0.67	3.04***	0.23, 1.10
Age	−0.25	−5.85	−0.38,−0.19	−0.01	−0.78	−0.05, 0.02	−0.25	−5.19***	−0.35,−0.15
Social support	0.16	3.77***	0.19, 0.63	0.30	7.17***	0.22, 0.39	0.19	1.60	−0.04, 0.42
Grit				0.23	5.53***	0.15, 0.31	0.29	2.55**	0.06, 0.52
Social support and grit				0.09	2.34***	0.01, 0.16	0.21	1.99*	0.01, 0.42
Dispositional optimism							0.40	3.36***	0.16, 0.63
Dispositional optimism * grit							−0.21	−2.0*	−0.42,−0.01
R^2		0.09			0.20			0.14	
F		17.66***			26.14***			12.06***	

*The 95% confidence intervals for all predictors were obtained using the bootstrap method. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.*

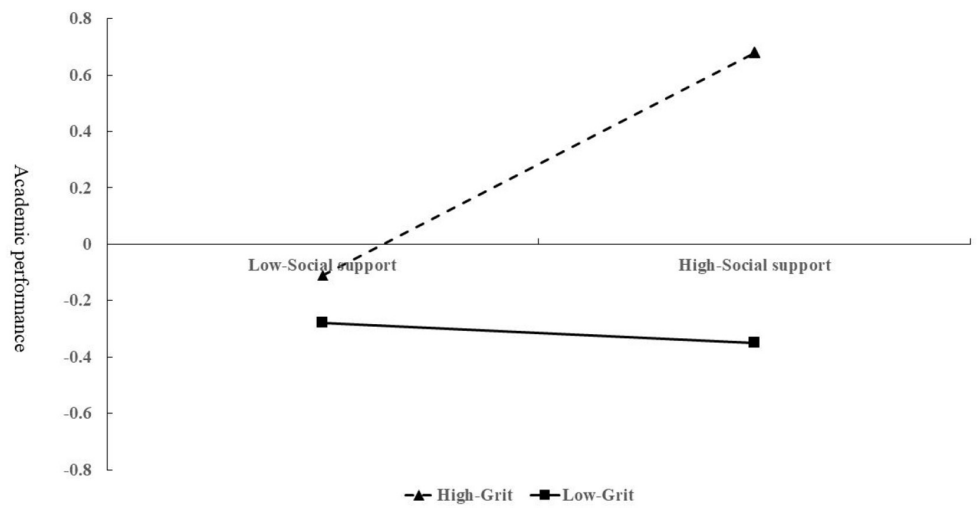

FIGURE 2 | Moderating effect of grit on the relationship between social support and academic performance.

low-income families with high grit levels, academic performance also increased significantly with increased levels of dispositional optimism (β = 0.18, t = 1.28, $p < 0.05$).

The study found that grit moderates the process in which social support affects academic performance through dispositional optimism. For children from low-income families with low grit levels, the direct effect of social support on academic performance is weak. For children from low-income families with high or low levels of grit, the social support impact on academic performance through dispositional optimism is stronger.

DISCUSSION

In this study we created a moderated mediation model, which comprehensively examined the influence of social factors (social

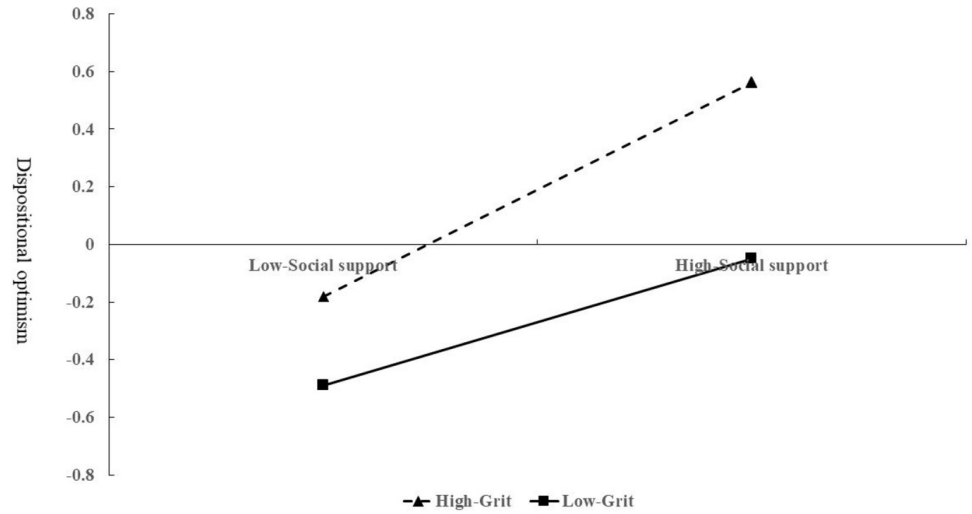

FIGURE 3 | Moderating effect of grit on the relationship between social support and dispositional.

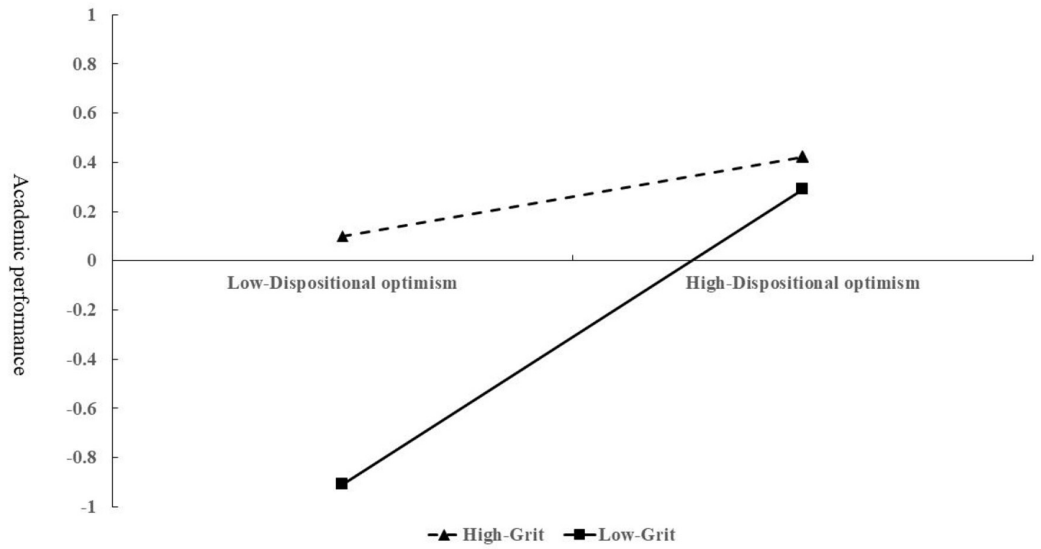

FIGURE 4 | Moderating effect of grit on the relationship between dispositional optimism and academic performance.

support) and individual attributes (dispositional optimism and grit) on academic performance. We explored the moderating effect of dispositional optimism on the relationship between social support and academic performance of children from low-income families, as well as the moderating role of grit in the process. The results revealed that social support mechanisms have certain theoretical and practical significance for improving the academic performance of children from low-income families.

The Mediating Effect of Dispositional Optimism on Social Support and Academic Performance

Based on the main effect model of social support, it appears that social support benefits individuals' physiological and psychological adaptation and acts as a protective factor (Cohen and Wills, 1985). The study results indicated that social support has a direct and positive predictive effect on academic performance: higher support levels lead to better academic performance for children from low-income families.

Further analysis found that higher levels of social support improve academic performance by increasing dispositional optimism, which, to a certain extent, corroborates the main effect model. Consistent with the results of previous studies, we found that social support has a positive impact on children from low-income families (Malecki and Demaray, 2006). Our findings underline that individuals with high social support levels have more positive self-perceptions; this includes positive evaluations of their environment and high

expectations of future success. The evidence suggests that the emotional warmth provided by social support helps to enhance the optimism of children from low-income families as well (Martínez-Martí and Ruch, 2017).

The results reveal that dispositional optimism helps to improve the academic performance of children from low-income families (Heinonen et al., 2006). Dispositional optimism reflects the positive perception of disadvantaged situations by children from low-income families and their motivational tendency toward successful adaptation. Research outcomes suggest that even if children from low-income families face many difficulties and risk factors, social support and dispositional optimism still play important roles. Therefore, social support may have an impact on their academic performance, through dispositional optimism.

The Moderating Effect of Grit on the Mediation Effect

The structural equation model analysis shows that grit plays a moderating role in the direct pathway of "social support → dispositional optimism → academic performance." Consistent with the results of previous studies, it was seen that high grit levels can improve academic performance in children from low-income families (Hagger and Hamilton, 2018). The stress buffer hypothesis states that positive individual factors can play a role in buffering stress, allowing the individual to cope better. As a result, children from low-income families with sound grit attributes can still adapt well in negative situations (Levpuscek et al., 2012; Pereira et al., 2016).

The results also indicate that children from low-income families with high grit levels perform better academically, compared to children from low-income families with low grit levels, regardless of whether they are in environments with high or low social support levels. Previous studies have found that increased social support can motivate children to achieve better academic performance (Rueger et al., 2010). Similarly, when children perceive a lack of social support, they are more driven to change the *status quo* through means such as self-motivated learning and increased resilience (Fan et al., 2018).

The purpose of this study was to show that grit plays a moderating role in the first half of the mediation pathway of "social support → dispositional optimism → academic performance," indicating that high grit levels play a moderating role in the establishment of dispositional optimism in children from low-income families. Based on the gain and loss spiral model in resource conservation theory, higher grit levels benefit the perception of social support and promote dispositional optimism in children from low-income families (Cao and Qu, 2014).

However, lower grit levels increase the vulnerability of children from low-income families to the pressures and stress caused by resource loss, while the existence of such pressures hinders resource input and accelerates resource loss, thus compounding the problem. This also reveals that a low grit level is not conducive to the development of positive psychological qualities in children from low-income families and that this may lead to a decreased perception of social support. This study also found that grit plays a moderating role in the second half of the mediation pathway of "social support → dispositional optimism → academic performance," demonstrating that children from low-income families with high grit levels can improve their optimism attributes and thereby maintain good academic performance. Previous studies have shown that the optimism and grit of children from low-income families can buffer academic pressure. Children with higher levels of optimism and grit have stronger internal learning motivations and recognize the value of learning, which positively affects their academic performance (Loftus et al., 2020).

Implications and Limitations of This Study

In this study we constructed and tested a moderated mediation model and explored the interconnection between social support and academic performance of children from low-income families. Our findings have significant theoretical and practical implications for effectively improving the academic performance of children from low-income families. The results suggest that perceived social support can positively predict the academic performance of children from low-income families. Simultaneously, our findings emphasize the need for improvement of grit levels and dispositional optimism in children from low-income families in order to improve their academic performance.

The study still has some limitations. First, it is difficult for cross-sectional studies to reveal the causal relationships between variables, and we believe that follow-up studies should be designed for future investigations of this topic. Second, the subjective measure (scale) of academic performance can also affect the perception of own performance. We suggest that future studies consider the integration of more objective poverty indicators. Third, this study focused mainly on the protective factors that affect academic performance (social support, grit, and dispositional optimism), and did not explore the adverse factors that affect academic performance. We believe that further investigation as to the effects of these factors is warranted.

CONCLUSION

The conclusions of this study are as follows. First, social support has a significant positive predictive effect on the academic performance of children from low-income families. Second, dispositional optimism has a mediating effect on the relationship between social support and academic performance: social support can positively affect the dispositional optimism of children from low-income families, thereby improving their academic performance. Third, grit plays a moderating role in the direct effect of "social support → academic performance," and in the first and second halves of the indirect effect of "social support → dispositional optimism → academic performance."

Specifically, social support is conducive to the development of dispositional optimism in children from low-income

families, which in turn improves their academic performance. Simultaneously, higher grit can promote the positive impact of dispositional optimism and improvement in academic performance.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author/s.

ETHICS STATEMENT

The study was reviewed and approved by the Academic Committee of the College of Education of Hunan Agricultural University. Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin.

AUTHOR CONTRIBUTIONS

XW was mainly responsible for the overall conception and design of this study, and also wrote the manuscript and carried out the statistical analysis. ZL carried out the investigation and data collation work, and the language polishing for the manuscript. Both authors contributed to the article and approved the submitted version.

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REFERENCES

Alarcon, G. M., Bowling, N. A., and Khazon, S. (2013). Great expectations: a meta-analytic examination of optimism and hope. *Pers. Individ. Dif.* 54, 821–827. doi: 10.1016/j.paid.2012.12.004

Alloway, R., and Bebbington, P. (1987). The buffer theory of social support-a review of the literature. *Psychol. Med.* 17, 91–108. doi: 10.1017/S0033291700013015

Beaujean, A. A., Firmin, M. W., Attai, S., Johnson, C. B., Firmin, R. L., and Mena, K. E. (2011). Using personality and cognitive ability to predict academic achievement in a young adult sample. *Pers. Individ. Dif.* 51, 709–714. doi: 10.1016/j.paid.2011.06.023

Bellamy, C. (2005). The state of the world's children, 2005: childhood under threat. *Future Surv.* 6, 71–73. doi: 10.1111/j.1365-2923.1987.tb00517.x

Bolger, N., and Amarel, D. (2007). Effects of social support visibility on adjustment to stress: experimental evidence. *J. Pers. Soc. Psychol.* 92:458. doi: 10.1037/0022-3514.92.3.458

Brissette, I., Scheier, M. F., and Carver, C. S. (2002). The role of optimism in social network development, coping, and psychological adjustment during a life transition. *J. Pers. Soc. Psychol.* 82:102. doi: 10.1037//0022-3514.82.1.102

Cao, X., and Qu, J. J. (2014). The origin of resource preservation theory, analysis of main contents and enlightenment. *Hum. Res. Dev. China* 15, 75–80.

China Children's Development Foundation (2018). *China Child Development Report 2017: Anti Poverty and Early Childhood Development*. Beijing: China Development Press.

Cohen, S., and Wills, T. A. (1985). Stress, social support, and the buffering hypothesis. *Psychol. Bull.* 98:310. doi: 10.1037/0033-2909.98.2.310

Creswell, J. W. (2007). in *Qualitative Inquiry and Research Design: Choosing Among Five Approaches*, 2nd Edn, ed. C. N. Poth (London: Sage), 488.

Duckworth, A. L., Peterson, C., Matthews, M. D., and Kelly, D. R. (2007). Grit: perseverance and passion for long-term goals. *J. Pers. Soc. Psychol.* 92:1087. doi: 10.1037/0022-3514.92.6.1087

Duckworth, A. L., and Quinn, P. D. (2009). Development and validation of the short grit scale (Grit-S). *J. Pers. Assess.* 91, 166–174. doi: 10.1080/00223890802634290

Fan, X. H., Zhou, N., He, Q., Yu, L. Z., Zhu, D., and Meng, H. (2018). Psychological capital and academic achievement of left behind children in rural areas: mediating effect with regulation. *Chinese J. Clin. Psychol.* 3, 551–556.

Fisher, J. D., Nadler, A., and Whitcher-Alagna, S. (1982). Recipient reactions to aid. *Psychol. Bull.* 91:27. doi: 10.1037/0033-2909.91.1.27

Hagger, M. S., and Hamilton, K. (2018). Grit and self-discipline as predictors of effort and academic attainment. *Br. J. Educ. Psychol.* 89, 324–342. doi: 10.1111/bjep.12241

Hair, N. L., Hanson, J. L., Wolfe, B. L., and Pollak, S. D. (2015). Association of child poverty, brain development, and academic achievement. *JAMA pediatr.* 169, 822–829. doi: 10.1001/jamapediatrics.2015.1475

Heinonen, K., Räikkönen, K., Matthews, K. A., Scheier, M. F., Raitakari, O. T., Pulkki, L., et al. (2006). Socioeconomic status in childhood and adulthood: associations with dispositional optimism and pessimism over a 21-year follow-up. *J. Personal.* 74, 1111–1126. doi: 10.1111/j.1467-6494.2006.00404.x

Hobfoll, S. E. (1989). Conservation of resources: a new attempt at conceptualizing stress. *Am. Psychol.* 44, 513–524. doi: 10.1037/0003-066X.44.3.513

Kundu, A. (2017). Grit and agency: a framework for helping students in poverty to achieve academic greatness. *Natl. Youth-At-Risk J.* 2:69. doi: 10.20429/nyarj.2017.020205

Lee, J., and Shute, V. J. (2010). Personal and social-contextual factors in K–12 academic performance: an integrative perspective on student learning. *Educ. Psychol.* 45, 185–202. doi: 10.1080/00461520.2010.493471

Lerner, R. M., and Hood, K. E. (1986). Plasticity in development: concepts and issues for intervention. *J. Appl. Dev. Psychol.* 7, 139–152. doi: 10.1016/0193-3973(86)90025-0

Lever, J. P., Pinol, N. L., and Uralde, J. H. (2005). Poverty, psychological resources and subjective well-being. *Soc. Indic. Res.* 73, 375–408. doi: 10.1007/s11205-004-1072-7

Levpuscek, M. P., Zupancic, M., and Socan, G. (2012). Predicting achievement in mathematics in adolescent students: the role of individual and social factors. *J. Early Adolesc.* 33, 523–551. doi: 10.1177/0272431612450949

Li, Z., Yin, X. Y., and Cai, T. S. (2013). The structure of dispositional optimism: traditional factor models and bifactor model. *Chinese J. Clin. Psychol.* 21, 45–48.

Liu, Z. M., and Gao, W. W. (2020). The relationship between perseverance and academic achievement: different mediating effects of intentional and spontaneous wandering. *Psychol. Sci.* 43, 1348–1354.

Loftus, T. J., Filiberto, A. C., Rosenthal, M. D., Arnaoutakis, G. J., Upchurch, G. R., Dimick, J. B., et al. (2020). Performance advantages for grit and optimism. *Am. J. Surg.* 220, 10–18. doi: 10.1016/j.amjsurg.2020.01.057

Luthans, F., Avey, J. B., Avolio, B. J., Norman, S. M., and Combs, G. M. (2006). Psychological capital development: toward a micro-intervention. *J. Organ. Behav.* 27, 387–393. doi: 10.1002/job.373

Malecki, C. K., and Demaray, M. K. (2006). Social support as a buffer in the relationship between socioeconomic status and academic performance. *Sch. Psychol. Q.* 21:375. doi: 10.1037/h0084129

Malecki, C. K., and Demaray, M. K. (2002). Measuring perceived social support: development of the child and adolescent social support scale (CASSS). *Psychol. Sch.* 39, 1–18. doi: 10.1002/pits.10004

Martínez-Martí, M. L., and Ruch, W. (2017). Character strengths predict resilience over and above positive affect, self-efficacy, optimism, social support, self-esteem, and life satisfaction. *J. Posit. Psychol.* 12, 110–119. doi: 10.1080/17439760.2016.1163403

McAdams, D. P., and Olson, B. D. (2010). Personality development: continuity and change over the life course. *Ann. Rev. Psychol.* 61, 517–542. doi: 10.1146/annurev.psych.093008.100507

Miloseva, L., Vukosavljevic-Gvozden, T., Richter, K., Milosev, V., and Niklewski, G. (2017). Perceived social support as a moderator between negative life events and depression in adolescence: implications for prediction and targeted prevention. *EPMA J.* 8, 237–245. doi: 10.1007/s13167-017-0095-5

Mosanya, M. (2019). Exploring cultural intelligence relationships with growth mindset, grit, coping and academic stress in the United Arab Emirates. *Middle East J. Positive Psychol.* 5, 42–59.

Pereira, A., Pereira, C. R., and Monteiro, M. B. (2016). Normative pressure to reduce prejudice against homosexuals: the buffering role of beliefs about the nature of homosexuality. *Pers. Individ. Dif.* 96, 88–99. doi: 10.1016/j.paid.2016.02.042

Roux, C., Goldsmith, K., and Bonezzi, A. (2015). On the psychology of scarcity: when reminders of resource scarcity promote selfish (and generous) behavior. *J. Consum. Res.* 42, 615–631. doi: 10.2139/ssrn.2147919

Rueger, S. Y., Malecki, C. K., and Demaray, M. K. (2010). Relationship between multiple sources of perceived social support and psychological and academic adjustment in early adolescence: comparisons across gender. *J. Youth Adolesc.* 39:47. doi: 10.1007/s10964-008-9368-6

Scheier, M. F., Carver, C. S., and Bridges, M. W. (1994). Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and self-esteem): a reevaluation of the Life orientation test. *J. Pers. Soc. Psychol.* 67:1063. doi: 10.1037//0022-3514.67.6.1063

Scheier, M. F., Weintraub, J. K., and Carver, C. S. (1986). Coping with stress: divergent strategies of optimists and pessimists. *J. Pers. Soc. Psychol.* 51:1257. doi: 10.1037/0022-3514.51.6.1257

Schöllgen, I., Huxhold, O., Schüz, B., and Tesch-Römer, C. (2011). Resources for health: differential effects of optimistic self-beliefs and social support according to socioeconomic status. *Health Psychol.* 30:326. doi: 10.1037/a0022514

Siu, O. L., Bakker, A. B., and Jiang, X. (2014). Psychological capital among university students: relationships with study engagement and intrinsic motivation. *J. Happiness Stud.* 15, 979–994. doi: 10.1007/s10902-013-9459-2

Smith, P. A., and Hoy, W. K. (2015). Academic optimism and student achievement in urban elementary schools. *J. Educ. Admin.* 45, 556–568. doi: 10.1108/09578230710778196

Vasquez, A. C., Patall, E. A., Fong, C. J., Corrigan, A. S., and Pine, L. (2016). Parent autonomy support, academic achievement, and psychosocial functioning: a meta-analysis of research. *Educ. Psychol. Rev.* 28, 605–644. doi: 10.1007/s10648-015-9329-z

Wen, Z. L., and Ye, B. J. (2014). Moderated mediation model test method: competition or substitution. *J. Psychol.* 46, 714–726.

Ye, Y. M., and Dai, X. Y. (2008). Development of Social Support Scale for university students. *Chinese J. Clin. Psychol.* 16, 456–458.

Yoshikawa, H., Aber, J. L., and Beardslee, W. R. (2012). The effects of poverty on the mental, emotional, and behavioral health of children and youth: implications for prevention . *Am. Psychol.* 67:272. doi: 10.1109/98.486976

Yu, L., and Suen, H. K. (2005). Historical and contemporary exam-driven education fever in China. *KEDI J. Educ. Policy* 2, 17–33.

Zhou, H., and Long, L. R. (2004). Statistical test and control method of common method deviation. *Prog. Psychol. Sci.* 12, 942–942.

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Academic Stress and Mental Well-Being in College Students: Correlations, Affected Groups, and COVID-19

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Academic stress may be the single most dominant stress factor that affects the mental well-being of college students. Some groups of students may experience more stress than others, and the coronavirus disease 19 (COVID-19) pandemic could further complicate the stress response. We surveyed 843 college students and evaluated whether academic stress levels affected their mental health, and if so, whether there were specific vulnerable groups by gender, race/ethnicity, year of study, and reaction to the pandemic. Using a combination of scores from the Perception of Academic Stress Scale (PAS) and the Short Warwick-Edinburgh Mental Well-Being Scale (SWEMWBS), we found a significant correlation between worse academic stress and poor mental well-being in all the students, who also reported an exacerbation of stress in response to the pandemic. In addition, SWEMWBS scores revealed the lowest mental health and highest academic stress in non-binary individuals, and the opposite trend was observed for both the measures in men. Furthermore, women and non-binary students reported higher academic stress than men, as indicated by PAS scores. The same pattern held as a reaction to COVID-19-related stress. PAS scores and responses to the pandemic varied by the year of study, but no obvious patterns emerged. These results indicate that academic stress in college is significantly correlated to psychological well-being in the students who responded to this survey. In addition, some groups of college students are more affected by stress than others, and additional resources and support should be provided to them.

Keywords: academic stress, well-being, college students, Perception of Academic Stress, Short Warwick-Edinburgh Mental Well-Being Scale, COVID-19

INTRODUCTION

Late adolescence and emerging adulthood are transitional periods marked by major physiological and psychological changes, including elevated stress (Hogan and Astone, 1986; Arnett, 2000; Shanahan, 2000; Spear, 2000; Scales et al., 2015; Romeo et al., 2016; Barbayannis et al., 2017; Chiang et al., 2019; Lally and Valentine-French, 2019; Matud et al., 2020). This pattern is particularly true for college students. According to a 2015 American College Health Association-National College

Health Assessment survey, three in four college students self-reported feeling stressed, while one in five college students reported stress-related suicidal ideation (Liu, C. H., et al., 2019; American Psychological Association, 2020). Studies show that a stressor experienced in college may serve as a predictor of mental health diagnoses (Pedrelli et al., 2015; Liu, C. H., et al., 2019; Karyotaki et al., 2020). Indeed, many mental health disorders, including depression, anxiety, and substance abuse disorder, begin during this period (Blanco et al., 2008; Pedrelli et al., 2015; Saleh et al., 2017; Reddy et al., 2018; Liu, C. H., et al., 2019).

Stress experienced by college students is multi-factorial and can be attributed to a variety of contributing factors (Reddy et al., 2018; Karyotaki et al., 2020). A growing body of evidence suggests that academic-related stress plays a significant role in college (Misra and McKean, 2000; Dusselier et al., 2005; Elias et al., 2011; Bedewy and Gabriel, 2015; Hj Ramli et al., 2018; Reddy et al., 2018; Pascoe et al., 2020). For instance, as many as 87% of college students surveyed across the United States cited education as their primary source of stress (American Psychological Association, 2020). College students are exposed to novel academic stressors, such as an extensive academic course load, substantial studying, time management, classroom competition, financial concerns, familial pressures, and adapting to a new environment (Misra and Castillo, 2004; Byrd and McKinney, 2012; Ekpenyong et al., 2013; Bedewy and Gabriel, 2015; Ketchen Lipson et al., 2015; Pedrelli et al., 2015; Reddy et al., 2018; Liu, C. H., et al., 2019; Freire et al., 2020; Karyotaki et al., 2020). Academic stress can reduce motivation, hinder academic achievement, and lead to increased college dropout rates (Pascoe et al., 2020).

Academic stress has also been shown to negatively impact mental health in students (Li and Lin, 2003; Eisenberg et al., 2009; Green et al., 2021). Mental, or psychological, well-being is one of the components of positive mental health, and it includes happiness, life satisfaction, stress management, and psychological functioning (Ryan and Deci, 2001; Tennant et al., 2007; Galderisi et al., 2015; Trout and Alsandor, 2020; Defeyter et al., 2021; Green et al., 2021). Positive mental health is an understudied but important area that helps paint a more comprehensive picture of overall mental health (Tennant et al., 2007; Margraf et al., 2020). Moreover, positive mental health has been shown to be predictive of both negative and positive mental health indicators over time (Margraf et al., 2020). Further exploring the relationship between academic stress and mental well-being is important because poor mental well-being has been shown to affect academic performance in college (Tennant et al., 2007; Eisenberg et al., 2009; Freire et al., 2016).

Perception of academic stress varies among different groups of college students (Lee et al., 2021). For instance, female college students report experiencing increased stress than their male counterparts (Misra et al., 2000; Eisenberg et al., 2007; Evans et al., 2018; Lee et al., 2021). Male and female students also respond differently to stressors (Misra et al., 2000; Verma et al., 2011). Moreover, compared to their cisgender peers, non-binary students report increased stressors and mental health issues (Budge et al., 2020). The academic year of study of the college students has also been shown to impact academic stress levels (Misra and McKean, 2000; Elias et al., 2011; Wyatt et al., 2017; Liu, C. H., et al., 2019; Defeyter et al., 2021). While several studies indicate that racial/ethnic minority groups of students, including Black/African American, Hispanic/Latino, and Asian American students, are more likely to experience anxiety, depression, and suicidality than their white peers (Lesure-Lester and King, 2004; Lipson et al., 2018; Liu, C. H., et al., 2019; Kodish et al., 2022), these studies are limited and often report mixed or inconclusive findings (Liu, C. H., et al., 2019; Kodish et al., 2022). Therefore, more studies should be conducted to address this gap in research to help identify subgroups that may be disproportionately impacted by academic stress and lower well-being.

The coronavirus disease 19 (COVID-19) pandemic is a major stressor that has led to a mental health crisis (American Psychological Association, 2020; Dong and Bouey, 2020). For college students, the COVID-19 pandemic has resulted in significant changes and disruptions to daily life, elevated stress levels, and mental and physical health deterioration (American Psychological Association, 2020; Husky et al., 2020; Patsali et al., 2020; Son et al., 2020; Clabaugh et al., 2021; Lee et al., 2021; Lopes and Nihei, 2021; Yang et al., 2021). While any college student is vulnerable to these stressors, these concerns are amplified for members of minority groups (Salerno et al., 2020; Clabaugh et al., 2021; McQuaid et al., 2021; Prowse et al., 2021; Kodish et al., 2022). Identifying students at greatest risk provides opportunities to offer support, resources, and mental health services to specific subgroups.

The overall aim of this study was to assess academic stress and mental well-being in a sample of college students. Within this umbrella, we had several goals. First, to determine whether a relationship exists between the two constructs of perceived academic stress, measured by the Perception of Academic Stress Scale (PAS), and mental well-being, measured by the Short Warwick-Edinburgh Mental Well-Being Scale (SWEMWBS), in college students. Second, to identify groups that could experience differential levels of academic stress and mental health. Third, to explore how the perception of the ongoing COVID-19 pandemic affected stress levels. We hypothesized that students who experienced more academic stress would have worse psychological well-being and that certain groups of students would be more impacted by academic- and COVID-19-related stress.

MATERIALS AND METHODS

Survey Instrument

A survey was developed that included all questions from the Short Warwick-Edinburgh Mental Well-Being (Tennant et al., 2007; Stewart-Brown and Janmohamed, 2008) and from the Perception of Academic Stress Scale (Bedewy and Gabriel, 2015). The Short Warwick-Edinburgh Mental Well-Being Scale is a seven-item scale designed to measure mental well-being and positive mental health (Tennant et al., 2007; Fung, 2019; Shah et al., 2021). The Perception of Academic Stress Scale is an 18-item scale designed to assess sources of academic stress perceived by individuals and measures three main academic

stressors: academic expectations, workload and examinations, and academic self-perceptions of students (Bedewy and Gabriel, 2015). These shorter scales were chosen to increase our response and study completion rates (Kost and de Rosa, 2018). Both tools have been shown to be valid and reliable in college students with Likert scale responses (Tennant et al., 2007; Bedewy and Gabriel, 2015; Ringdal et al., 2018; Fung, 2019; Koushede et al., 2019). Both the SWEMWBS and PAS scores are a summation of responses to the individual questions in the instruments. For the SWEMWBS questions, a higher score indicates better mental health, and scores range from 7 to 35. Similarly, the PAS questions are phrased such that a higher score indicates lower levels of stress, and scores range from 18 to 90. We augmented the survey with demographic questions (e.g., age, gender, and race/ethnicity) at the beginning of the survey and two yes/no questions and one Likert scale question about the impact of the COVID-19 pandemic at the end of our survey.

Sample

Participants for the study were self-reported college students between the ages of 18 and 30 years who resided in the United States, were fluent in English, and had Internet access. Participants were solicited through Prolific (https://prolific.co) in October 2021. A total of 1,023 individuals enrolled in the survey. Three individuals did not agree to participate after beginning the survey. Two were not fluent in English. Thirteen individuals indicated that they were not college students. Two were not in the 18–30 age range, and one was located outside of the United States. Of the remaining individuals, 906 were full-time students and 96 were part-time students. Given the skew of the data and potential differences in these populations, we removed the part-time students. Of the 906 full-time students, 58 indicated that they were in their fifth year of college or higher. We understand that not every student completes their undergraduate studies in 4 years, but we did not want to have a mixture of undergraduate and graduate students with no way to differentiate them. Finally, one individual reported their age as a non-number, and four individuals did not answer a question about their response to the COVID-19 pandemic. This yielded a final sample of 843 college students.

Data Analyses

After reviewing the dataset, some variables were removed from consideration due to a lack of consistency (e.g., some students reported annual income for themselves and others reported family income) or heterogeneity that prevented easy categorization (e.g., field of study). We settled on four variables of interest: gender, race/ethnicity, year in school, and response to the COVID-19 pandemic (**Table 1**). Gender was coded as female, male, or non-binary. Race/ethnicity was coded as white or Caucasian; Black or African American; East Asian; Hispanic, Latino, or of Spanish origin; or other. Other was used for groups that were not well-represented in the sample and included individuals who identified themselves as Middle Eastern, Native American or Alaskan Native, and South Asian, as well as individuals who chose "other" or "prefer not to answer" on the survey. The year of study was coded as one through four, and COVID-19 stress was coded as two groups, no change/neutral response/reduced stress or increased stress.

Our first goal was to determine whether there was a relationship between self-reported academic stress and mental health, and we found a significant correlation (see Results section). Given the positive correlation, a multivariate analysis of variance (MANOVA) with a model testing the main effects of gender, race/ethnicity, and year of study was run in SPSS v 26.0. A factorial MANOVA would have been ideal, but our data were drawn from a convenience sample, which did not give equal representation to all groupings, and some combinations of gender, race/ethnicity, and year of study were poorly represented (e.g., a single individual). As such, we determined that it would be better to have a lack of interaction terms as a limitation to the study than to provide potentially spurious results. Finally, we used chi-square analyses to assess the effect of potential differences in the perception of the COVID-19 pandemic on stress levels in general among the groups in each category (gender, race/ethnicity, and year of study).

RESULTS

In terms of internal consistency, Cronbach's alpha was 0.82 for the SMEMWBS and 0.86 for the PAS. A variety of descriptors have been applied to Cronbach's alpha values. That said, 0.7 is often considered a threshold value in terms of acceptable internal consistency, and our values could be considered "high" or "good" (Taber, 2018).

The participants in our study were primarily women (78.5% of respondents; **Table 1**). Participants were not equally distributed among races/ethnicities, with the majority of students selecting

TABLE 1 | Characteristics of the participants in the study.

Gender			Race/ethnicity			Year of study			Response to COVID-19		
Female	662	78.5%	White or Caucasian	560	66.4%	1	134	15.9%	No impact/ neutral response/decreased stress	165	19.6%
Male	141	16.7%	Black or African American	66	7.8%	2	233	27.6%			
Nonbinary	40	4.7%	East Asian	78	9.3%	3	251	29.8%	Increased stress	678	80.4%
			Hispanic, Latino, or of Spanish origin	74	8.8%	4	225	26.7%			
			Other	65	7.7%						

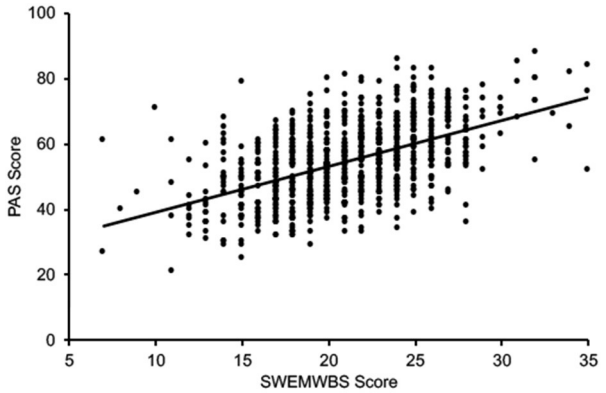

FIGURE 1 | SWEMWBS and PAS scores for all participants.

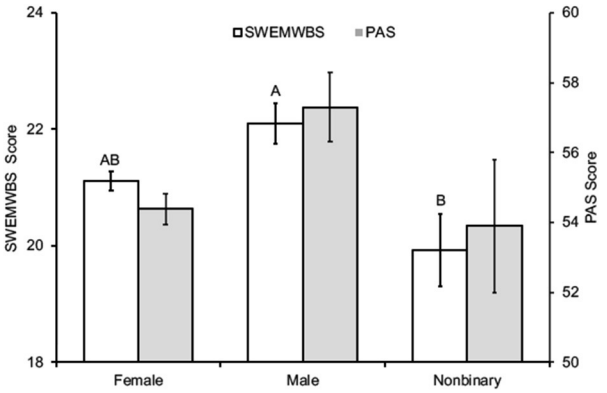

FIGURE 2 | SWEMWBS and PAS scores according to gender (mean ± SEM). Different letters for SWEMWBS scores indicate different statistical groupings ($p < 0.05$).

TABLE 2 | Results of the MANOVA.

	Pillai's trace	*F*	*p*	Partial eta squared
Gender	0.018	3.86	0.004	0.009
Race/ethnicity	0.022	2.32	0.02	0.011
Year of study	0.016	2.24	0.04	0.008

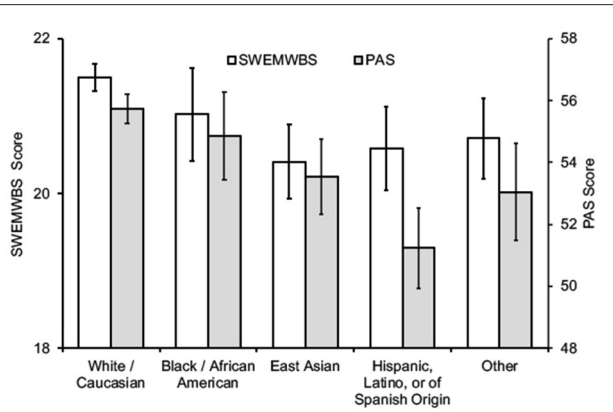

FIGURE 3 | SWEMWBS and PAS scores according to race/ethnicity (mean ± SEM).

white or Caucasian (66.4% of responders; **Table 1**), or years of study, with fewer first-year students than other groups (**Table 1**).

Students who reported higher academic stress also reported worse mental well-being in general, irrespective of age, gender, race/ethnicity, or year of study. PAS and SWEMWBS scores were significantly correlated ($r = 0.53$, $p < 0.001$; **Figure 1**), indicating that a higher level of perceived academic stress is associated with worse mental well-being in college students within the United States.

Among the subgroups of students, women, non-binary students, and second-year students reported higher academic stress levels and worse mental well-being (**Table 2**; **Figures 2–4**). In addition, the combined measures differed significantly between the groups in each category (**Table 2**). However, as measured by partial eta squared, the effect sizes were relatively small, given the convention of 0.01 = small, 0.06 = medium, and 0.14 = large differences (Lakens, 2013). As such, there were only two instances in which Tukey's *post-hoc* tests revealed more than one statistical grouping (**Figures 2–4**). For SWEMWBS score by gender, women were intermediate between men (high) and non-binary individuals (low) and not significantly different from either group (**Figure 2**). Second-year students had the lowest PAS scores for the year of study, and first-year students had the highest scores. Third- and fourth-year students were intermediate and not statistically different from the other two groups (**Figure 4**). There were no pairwise differences in academic stress levels or mental well-being among racial/ethnic groups.

The findings varied among categories in terms of stress responses due to the COVID-19 pandemic (**Table 3**). For gender, men were less likely than women or non-binary individuals to report increased stress from COVID-19 ($\chi^2 = 27.98$, df = 2, $p < 0.001$). All racial/ethnic groups responded similarly to the pandemic ($\chi^2 = 3.41$, df = 4, $p < 0.49$). For the year of study, first-year students were less likely than other cohorts to report increased stress from COVID-19 ($\chi^2 = 9.38$, df = 3, $p < 0.03$).

DISCUSSION

Our primary findings showed a positive correlation between perceived academic stress and mental well-being in United States college students, suggesting that academic stressors, including academic expectations, workload and grading, and students' academic self-perceptions, are equally important as psychological well-being. Overall, irrespective of gender, race/ethnicity, or year of study, students who reported higher academic stress levels experienced diminished mental well-being. The utilization of well-established scales and a large sample size are strengths of this study. Our results extend and contribute to the existing literature

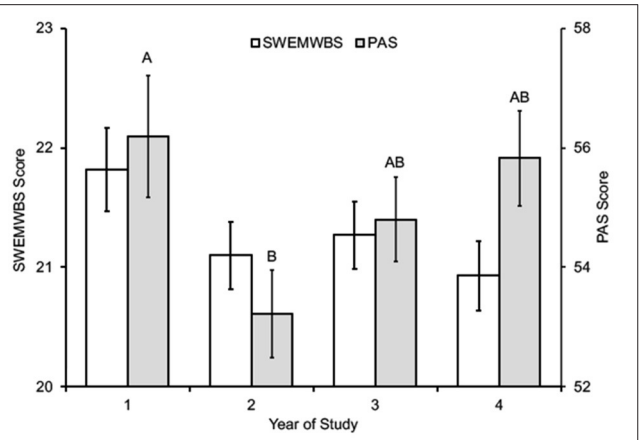

FIGURE 4 | SWEMWBS and PAS scores according to year in college (mean ± SEM). Different letters for PAS scores indicate different statistical groupings ($p < 0.05$).

TABLE 3 | Impact of COVID-19 on stress level by gender, race/ethnicity, and year of study.

	No change/neutral response/ reduced stress		Increased stress	
	n	**%**	***n***	**%**
Gender				
Female	118	17.8	544	82.2
Male	47	33.3	94	66.7
Nonbinary	0	0	40	100
Race/ethnicity				
White or Caucasian	104	18.6	456	81.4
Black or African American	16	24.2	50	75.8
East Asian	20	25.6	58	74.4
Hispanic, Latino, or of Spanish origin	14	18.9	60	81.1
Middle Eastern, Native American, Alaskan Native, South Asian, other, or prefer not to answer	11	16.9	54	83.1
Year of study				
1	38	28.4	96	71.6
2	43	18.5	190	81.5
3	39	15.5	212	84.5
4	45	20	180	80

on stress by confirming findings from past studies that reported higher academic stress and lower psychological well-being in college students utilizing the same two scales (Green et al., 2021; Syed, 2021). To our knowledge, the majority of other prior studies with similar findings examined different components of stress, studied negative mental health indicators, used different scales or methods, employed smaller sample sizes, or were conducted in different countries (Li and Lin, 2003; American Psychological Association, 2020; Husky et al., 2020; Pascoe et al., 2020; Patsali et al., 2020; Clabaugh et al., 2021; Lee et al., 2021; Lopes and Nihei, 2021; Yang et al., 2021).

This study also demonstrated that college students are not uniformly impacted by academic stress or pandemic-related stress and that there are significant group-level differences in mental well-being. Specifically, non-binary individuals and second-year students were disproportionately impacted by academic stress. When considering the effects of gender, non-binary students, in comparison to gender-conforming students, reported the highest stress levels and worst psychological well-being. Although there is a paucity of research examining the impact of academic stress in non-binary college students, prior studies have indicated that non-binary adults face adverse mental health outcomes when compared to male and female-identifying individuals (Thorne et al., 2018; Jones et al., 2019; Budge et al., 2020). Alarmingly, Lipson et al. (2019) found that gender non-conforming college students were two to four times more likely to experience mental health struggles than cisgender students (Lipson et al., 2019). With a growing number of college students in the United States identifying as as non-binary, additional studies could offer invaluable insight into how academic stress affects this population (Budge et al., 2020).

In addition, we found that second-year students reported the most academic-related distress and lowest psychological well-being relative to students in other years of study. We surmise this may be due to this group taking advanced courses, managing heavier academic workloads, and exploring different majors. Other studies support our findings and suggest higher stress levels could be attributed to increased studying and difficulties with time management, as well as having less well-established social support networks and coping mechanisms compared to upperclassmen (Allen and Hiebert, 1991; Misra and McKean, 2000; Liu, X et al., 2019). Benefiting from their additional experience, upperclassmen may have developed more sophisticated studying skills, formed peer support groups, and identified approaches to better manage their academic stress (Allen and Hiebert, 1991; Misra and McKean, 2000). Our findings suggest that colleges should consider offering tailored mental health resources, such as time management and study skill workshops, based on the year of study to improve students' stress levels and psychological well-being (Liu, X et al., 2019).

Although this study reported no significant differences regarding race or ethnicity, this does not indicate that minority groups experienced less academic stress or better mental well-being (Lee et al., 2021). Instead, our results may reflect the low sample size of non-white races/ethnicities, which may not have given enough statistical power to corroborate. In addition, since coping and resilience are important mediators of subjective stress experiences (Freire et al., 2020), we speculate that the lower ratios of stress reported in non-white participants in our study (75 vs. 81) may be because they are more accustomed to adversity and thereby more resilient (Brown, 2008; Acheampong et al., 2019). Furthermore, ethnic minority students may face stigma when reporting mental health struggles (Liu, C. H., et al., 2019; Lee et al., 2021). For instance, studies showed that Black/African American, Hispanic/Latino, and Asian American students disclose fewer mental health issues than white students

(Liu, C. H., et al., 2019; Lee et al., 2021). Moreover, the ability to identify stressors and mental health problems may manifest differently culturally for some minority groups (Huang and Zane, 2016; Liu, C. H., et al., 2019). Contrary to our findings, other studies cited racial disparities in academic stress levels and mental well-being of students. More specifically, Negga et al. (2007) concluded that African American college students were more susceptible to higher academic stress levels than their white classmates (Negga et al., 2007). Another study reported that minority students experienced greater distress and worse mental health outcomes compared to non-minority students (Smith et al., 2014). Since there may be racial disparities in access to mental health services at the college level, universities, professors, and counselors should offer additional resources to support these students while closely monitoring their psychological well-being (Lipson et al., 2018; Liu, C. H., et al., 2019).

While the COVID-19 pandemic increased stress levels in all the students included in our study, women, non-binary students, and upperclassmen were disproportionately affected. An overwhelming body of evidence suggests that the majority of college students experienced increased stress levels and worsening mental health as a result of the pandemic (Allen and Hiebert, 1991; American Psychological Association, 2020; Husky et al., 2020; Patsali et al., 2020; Son et al., 2020; Clabaugh et al., 2021; Lee et al., 2021; Yang et al., 2021). Our results also align with prior studies that found similar subgroups of students experience disproportionate pandemic-related distress (Gao et al., 2020; Clabaugh et al., 2021; Hunt et al., 2021; Jarrett et al., 2021; Lee et al., 2021; Chen and Lucock, 2022). In particular, the differences between female students and their male peers may be the result of different psychological and physiological responses to stress reactivity, which in turn may contribute to different coping mechanisms to stress and the higher rates of stress-related disorders experienced by women (Misra et al., 2000; Kajantie and Phillips, 2006; Verma et al., 2011; Gao et al., 2020; Graves et al., 2021). COVID-19 was a secondary consideration in our study and survey design, so the conclusions drawn here are necessarily limited.

The implications of this study are that college students facing increased stress and struggling with mental health issues should receive personalized and specific mental health services, resources, and support. This is particularly true for groups that have been disproportionately impacted by academic stress and stress due to the pandemic. Many students who experience mental health struggles underutilize college services due to cost, stigma, or lack of information (Cage et al., 2020; Lee et al., 2021). To raise awareness and destigmatize mental health, colleges can consider distributing confidential validated assessments, such as the PAS and SWEMWBS, in class and teach students to self-score (Lee et al., 2021). These results can be used to understand how academic stress and mental well-being change over time and allow for specific and targeted interventions for vulnerable groups. In addition, teaching students healthy stress management techniques has been shown to improve psychological well-being (Alborzkouh et al., 2015). Moreover, adaptive coping strategies, including social and emotional support, have been found to improve the mental well-being of students, and stress-reduction peer support groups and workshops on campus could be beneficial in reducing stress and improving the self-efficacy of students (Ruthig et al., 2009; Baqutayan, 2011; Bedewy and Gabriel, 2015; Freire et al., 2020; Green et al., 2021; Suresh et al., 2021). Other interventions that have been effective in improving the coping skills of college students include cognitive-behavioral therapy, mindfulness mediation, and online coping tools (Kang et al., 2009; Regehr et al., 2013; Molla Jafar et al., 2015; Phang et al., 2015; Houston et al., 2017; Yusufov et al., 2019; Freire et al., 2020). Given that resilience has also been shown to help mediate stress and improve mental well-being during the COVID-19 pandemic, interventions focusing on enhancing resilience should be considered (Surzykiewicz et al., 2021; Skalski et al., 2022). Telemental health resources across colleges can also be implemented to reduce stigma and improve at-risk students' access to care (Toscos et al., 2018; Hadler et al., 2021). University campuses, professors, and counselors should consider focusing on fostering a more equitable and inclusive environment to encourage marginalized students to seek mental health support (Budge et al., 2020).

LIMITATIONS

While our study has numerous strengths, including using standardized instruments and a large sample size, this study also has several limitations due to both the methodology and sample. First, the correlational study design precludes making any causal relationships (Misra and McKean, 2000). Thereby, our findings should be taken in the context of academic stress and mental well-being, and recognize that mental health could be caused by other non-academic factors. Second, the PAS comprised only the perception of responses to academic stress, but stress is a multi-factorial response that encompasses both perceptions and coping mechanisms to different stressors, and the magnitude of stress varies with the perception of the degree of uncontrollability, unpredictability, or threat to self (Miller, 1981; Hobfoll and Walfisch, 1984; Lazarus and Folkman, 1984; Wheaton, 1985; Perrewé and Zellars, 1999; Schneiderman et al., 2005; Bedewy and Gabriel, 2015; Schönfeld et al., 2016; Reddy et al., 2018; Freire et al., 2020; Karyotaki et al., 2020). Third, the SWEMSBS used in our study and the data only measured positive mental health. Mental health pathways are numerous and complex, and are composed of distinct and interdependent negative and positive indicators that should be considered together (Margraf et al., 2020). Fourth, due to the small effect sizes and unequal representation for different combinations of variables, our analysis for both the PAS and SWEMSBS included only summed-up scales and did not examine group differences in response to the type of academic stressors or individual mental health questions.

An additional limitation is that the participants in our study were a convenience sample. The testing service we used, prolific.co, self-reports a sample bias toward young women of high levels of education (i.e., WEIRD bias) (Team Prolific, 2018). The skew toward this population was observed in our data, as 80% of our participants were women. While we

controlled for these factors, the possibility remains that the conclusions we draw for certain groups, such as nonbinary students, ethnic/racial minorities, and men, may not be as statistically powerful as they should be. Moreover, our pre-screening was designed to recruit undergraduate level, English-speaking, 18–30-year-olds who resided in the United States. This resulted in our participant demographics being skewed toward the WEIRD bias that was already inherent in the testing service we used. Future research will aim to be more inclusive of diverse races/ethnicities, sexual orientations, languages, educational backgrounds, socioeconomic backgrounds, and first-generation college students.

Another limitation of our study is the nature of satisficing. Satisficing is a response strategy in which a participant answers a question to satisfy its condition with little regard to the quality or accuracy of the answer (Roberts et al., 2019). Anonymous participants are more likely to satisfice than respondents who answer the question face-to-face (Krosnick et al., 2002). We sought to mitigate satisficing by offering financial incentives to increase response rates and decrease straight-lining, item skipping, total missing items, and non-completion (Cole et al., 2015). Concerns of poor data quality due to surveys offering financial incentives found little evidence to support that claim and may do the opposite (Cole et al., 2015). On the other hand, social desirability bias may have influenced the participant's self-reported responses, although our anonymous survey design aimed to reduce this bias (Joinson, 1999; Kecojevic et al., 2020).

FUTURE STUDIES

Future studies should replicate our study to validate our results, conduct longitudinal cohort studies to examine well-being and perceived academic stress over time, and aim for a more representative student sample that includes various groups, including diverse races/ethnicities, sexual orientations, socioeconomic backgrounds, languages, educational levels, and first-generation college students. Additionally, these studies should consider examining other non-academic stressors and students' coping mechanisms, both of which contribute to mental health and well-being (Lazarus and Folkman, 1984; Freire et al., 2020). Further explorations of negative and other positive indicators of mental health may offer a broader perspective (Margraf et al., 2020). Moreover, future research should consider extending our work by exploring group differences in relation to each factor in the PAS (i.e., academic expectations, workload and examinations, and self-perception of students) and SWEMBS to determine which aspects of academic stress and mental health were most affected and allow for the devising of targeted stress-reduction approaches. Ultimately, we hope our research spurs readers into advocating for greater academic support and access to group-specific mental health resources to reduce the stress levels of college students and improve their mental well-being.

CONCLUSION

Utilizing two well-established scales, our research found a statistically significant correlation between the perceived academic stress of university students and their mental well-being (i.e., the higher the stress, the worse the well-being). This relationship was most apparent among gender and grade levels. More specifically, non-binary and second-year students experienced greater academic burden and lower psychological well-being. Moreover, women, non-binary students, and upper-level students were disproportionately impacted by stress related to the COVID-19 pandemic.

Studies regarding broad concepts of stress and well-being using a questionnaire are limited, but our study adds value to the understanding of academic stress as a contributor to the overall well-being of college students during this specific point in time (i.e., the COVID-19 pandemic). Competition both for admission to college (Bound et al., 2009) and during college (Posselt and Lipson, 2016) has increased over time. Further, selective American colleges and universities draw applicants from a global pool. As such, it is important to document the dynamics of academic stress with renewed focus. We hope that our study sparks interest in both exploring and funding in-depth and well-designed psychological studies related to stress in colleges in the future.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Institutional Review Board at Rutgers University. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

GB and MB contributed to conceptualization, study design, IRB application, manuscript drafting, and revision. XZ participated in the conceptualization and design of the questionnaires. HB participated in subject recruitment and questionnaire collection. KP contributed to data analysis, table and figure preparation, manuscript drafting, and revision. XM contributed to conceptualization, study design, IRB application, supervision of the project, manuscript drafting, and revision. All authors contributed to the article and approved the submitted version.

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REFERENCES

Acheampong, C., Davis, C., Holder, D., Averett, P., Savitt, T., and Campbell, K. (2019). An exploratory study of stress coping and resiliency of black men at one medical school: a critical race theory perspective. *J. Racial Ethnic Health Disparit.* 6, 214–219. doi: 10.1007/s40615-018-0516-8

Alborzkouh, P., Nabati, M., Zainali, M., Abed, Y., and Shahgholy Ghahfarokhi, F. (2015). A review of the effectiveness of stress management skills training on academic vitality and psychological well-being of college students. *J. Med. Life* 8, 39–44.

Allen, S., and Hiebert, B. (1991). Stress and coping in adolescents. *Can. J. Counsel.* 25, 19–32.

American Psychological Association. (2020). *Stress in AmericaTM2020: A National Mental Health Crisis*. Washington, DC: American Psychological Association.

Arnett, J. J. (2000). Emerging adulthood. A theory of development from the late teens through the twenties. *Am. Psychol.* 55, 469–480. doi: 10.1037/0003-066X.55.5.469

Baqutayan, S. (2011). Stress and social support. *Indian J. Psychol. Med.* 33, 29–34. doi: 10.4103/0253-7176.85392

Barbayannis, G., Franco, D., Wong, S., Galdamez, J., Romeo, R. D., and Bauer, E. P. (2017). Differential effects of stress on fear learning and activation of the amygdala in pre-adolescent and adult male rats. *Neuroscience* 360, 210–219. doi: 10.1016/j.neuroscience.2017.07.058

Bedewy, D., and Gabriel, A. (2015). Examining perceptions of academic stress and its sources among university students: the perception of academic stress scale. *Health Psychol. Open* 2, 1–9. doi: 10.1177/2055102915596714

Blanco, C., Okuda, M., Wright, C., Hasin, D. S., Grant, B. F., Liu, S. M., et al. (2008). Mental health of college students and their non-college-attending peers: results from the National Epidemiologic Study on Alcohol and Related Conditions. *Arch. Gen. Psychiatry* 65, 1429–1437. doi: 10.1001/archpsyc.65.12.1429

Bound, J., Hershbein, B., and Long, B. T. (2009). Playing the admissions game: student reactions to increasing college competition. *J. Econ. Perspect.* 23, 119–146. doi: 10.1257/jep.23.4.119

Brown, D. L. (2008). African American resiliency: examining racial socialization and social support as protective factors. *J. Black Psychol.* 34, 32–48. doi: 10.1177/0095798407310538

Budge, S. L., Domínguez, S. Jr., and Goldberg, A. E. (2020). Minority stress in nonbinary students in higher education: the role of campus climate and belongingness. *Psychol. Sex. Orient. Gender Divers.* 7, 222–229. doi: 10.1037/sgd0000360

Byrd, D. R., and McKinney, K. J. (2012). Individual, interpersonal, and institutional level factors associated with the mental health of college students. *J. Am. Coll. Health* 60, 185–193. doi: 10.1080/07448481.2011.584334

Cage, E., Stock, M., Sharpington, A., Pitman, E., and Batchelor, R. (2020). Barriers to accessing support for mental health issues at university. *Stud. High. Educ.* 45, 1637–1649. doi: 10.1080/03075079.2018.1544237

Chen, T., and Lucock, M. (2022). The mental health of university students during the COVID-19 pandemic: an online survey in the UK. *PLoS ONE* 17, e0262562. doi: 10.1371/journal.pone.0262562

Chiang, J. J., Ko, A., Bower, J. E., Taylor, S. E., Irwin, M. R., and Fuligni, A. J. (2019). Stress, psychological resources, and HPA and inflammatory reactivity during late adolescence. *Dev. Psychopathol.* 31, 699–712. doi: 10.1017/S0954579418000287

Clabaugh, A., Duque, J. F., and Fields, L. J. (2021). Academic stress and emotional well-being in United States college students following onset of the COVID-19 pandemic. *Front. Psychol.* 12, 628787. doi: 10.3389/fpsyg.2021.628787

Cole, J. S., Sarraf, S. A., and Wang, X. (2015). *Does Use of Survey Incentives Degrade Data Quality?* Chicago, IL: Association for Institutional Research Annual Forum.

Defeyter, M. A., Stretesky, P. B., Long, M. A., Furey, S., Reynolds, C., Porteous, D., et al. (2021). Mental well-being in UK higher education during Covid-19: do students trust universities and the government? *Front. Public Health* 9, 646916. doi: 10.3389/fpubh.2021.646916

Dong, L., and Bouey, J. (2020). Public mental health crisis during COVID-19 Pandemic, China. *Emerging Infect. Dis.* 26, 1616–1618. doi: 10.3201/eid2607.200407

Dusselier, L., Dunn, B., Yongyi, W., Shelley, II, M., and Whalen, D. (2005). Personal, health, academic, and environmental predictors of stress in residence halls. *J. Am. Coll. Health* 54, 15–24. doi: 10.3200/JACH.54.1.15-24

Eisenberg, D., Golberstein, E., and Hunt, J. B. (2009). Mental health and academic success in college. *B.E. J Econ Anal Policy* 9, 1–35. doi: 10.2202/1935-1682.2191

Eisenberg, D., Gollust, S. E., Golberstein, E., and Hefner, J. L. (2007). Prevalence and correlates of depression, anxiety, and suicidality among university students. *Am. J. Orthopsychiatry* 77, 534–542. doi: 10.1037/0002-9432.77.4.534

Ekpenyong, C. E., Daniel, N. E., and Aribo, E. O. (2013). Associations between academic stressors, reaction to stress, coping strategies and musculoskeletal disorders among college students. *Ethiop. J. Health Sci.* 23, 98–112.

Elias, H., Ping, W. S., and Abdullah, M. C. (2011). Stress and academic achievement among undergraduate students in Universiti Putra Malaysia. *Proc. Soc. Behav. Sci.* 29, 646–655. doi: 10.1016/j.sbspro.2011.11.288

Evans, T. M., Bira, L., Gastelum, J. B., Weiss, L. T., and Vanderford, N. L. (2018). Evidence for a mental health crisis in graduate education. *Nat. Biotechnol.* 36, 282–284. doi: 10.1038/nbt.4089

Freire, C., Ferradás, M., Regueiro, B., Rodríguez, S., Valle, A., and Núñez, J. C. (2020). Coping strategies and self-efficacy in university students: a person-centered approach. *Front. Psychol.* 11, 841. doi: 10.3389/fpsyg.2020.00841

Freire, C., Ferradás, M. D., Valle, A., Núñez, J. C., and Vallejo, G. (2016). Profiles of psychological well-being and coping strategies among university students. *Front. Psychol.* 7, 1554. doi: 10.3389/fpsyg.2016.01554

Fung, S. (2019). Psychometric evaluation of the Warwick-Edinburgh Mental Well-being Scale (WEMWBS) with Chinese University Students. *Health Qual. Life Outcomes* 17, 46. doi: 10.1186/s12955-019-1113-1

Galderisi, S., Heinz, A., Kastrup, M., Beezhold, J., and Sartorius, N. (2015). Toward a new definition of mental health. *World Psychiatry* 14, 231–233. doi: 10.1002/wps.20231

Gao, W., Ping, S., and Liu, X. (2020). Gender differences in depression, anxiety, and stress among college students: a longitudinal study from China. *J. Affect. Disord.* 263, 292–300. doi: 10.1016/j.jad.2019.11.121

Graves, B. S., Hall, M. E., Dias-Karch, C., Haischer, M. H., and Apter, C. (2021). Gender differences in perceived stress and coping among college students. *PLoS ONE* 16, e0255634. doi: 10.1371/journal.pone.0255634

Green, Z. A., Faizi, F., Jalal, R., and Zadran, Z. (2021). Emotional support received moderates academic stress and mental well-being in a sample of Afghan university students amid COVID-19. *Int. J. Soc. Psychiatry*. 207640211057729. doi: 10.1177/00207640211057729. [Epub ahead of print].

Hadler, N. L., Bu, P., Winkler, A., and Alexander, A. W. (2021). College student perspectives of telemental health: a review of the recent literature. *Curr. Psychiatry Rep.* 23, 6. doi: 10.1007/s11920-020-01215-7

Hj Ramli, N. H., Alavi, M., Mehrinezhad, S. A., and Ahmadi, A. (2018). Academic stress and self-regulation among university students in Malaysia: mediator role of mindfulness. *Behav. Sci.* 8, 12. doi: 10.3390/bs8010012

Hobfoll, S. E., and Walfisch, S. (1984). Coping with a threat to life: a longitudinal study of self-concept, social support, and psychological distress. *Am. J. Community Psychol.* 12, 87–100. doi: 10.1007/BF00896930

Hogan, D. P., and Astone, N. M. (1986). The transition to adulthood. *Annu. Rev. Sociol.* 12, 109–130. doi: 10.1146/annurev.so.12.080186.000545

Houston, J. B., First, J., Spialek, M. L., Sorenson, M. E., and Mills-Sandoval, T., Lockett, et al. (2017). Randomized controlled trial of the Resilience and Coping Intervention (RCI) with undergraduate university students. *J Am. Coll. Health* 65, 1–9. doi: 10.1080/07448481.2016.1227826

Huang, C. Y., and Zane, N. (2016). Cultural influences in mental health treatment. *Curr. Opin. Psychol.* 8, 131–136. doi: 10.1016/j.copsyc.2015.10.009

Hunt, C., Gibson, G. C., Vander Horst, A., Cleveland, K. A., Wawrosch, C., Granot, M., et al. (2021). Gender diverse college students exhibit higher psychological distress than male and female peers during the novel coronavirus (COVID-19) pandemic. *Psychol. Sex. Orient. Gender Divers.* 8, 238–244. doi: 10.1037/sgd0000461

Husky, M. M., Kovess-Masfety, V., and Swendsen, J. D. (2020). Stress and anxiety among university students in France during Covid-19 mandatory confinement. *Compr. Psychiatry* 102:152191. doi: 10.1016/j.comppsych.2020.152191

Jarrett, B. A., Peitzmeier, S. M., Restar, A., Adamson, T., Howell, S., Baral, S., et al. (2021). Gender-affirming care, mental health, and economic stability in the time of COVID-19: a multi-national, cross-sectional study of transgender and nonbinary people. *PLoS ONE* 16, e0254215. doi: 10.1371/journal.pone.0254215

Joinson, A. (1999). Social desirability, anonymity, and Internet-based questionnaires. *Behav. Res. Methods Instrum. Comput.* 31, 433–438. doi: 10.3758/BF03200723

Jones, B. A., Pierre Bouman, W., Haycraft, E., and Arcelus, J. (2019). Mental health and quality of life in non-binary transgender adults: a case control study. *Int. J. Transgender.* 20, 251–262. doi: 10.1080/15532739.2019.1630346

Kajantie, E., and Phillips, D. I. (2006). The effects of sex and hormonal status on the physiological response to acute psychosocial stress. *Psychoneuroendocrinology* 31, 151–178. doi: 10.1016/j.psyneuen.2005.07.002

Kang, Y. S., Choi, S. Y., and Ryu, E. (2009). The effectiveness of a stress coping program based on mindfulness meditation on the stress, anxiety, and depression experienced by nursing students in Korea. *Nurse Educ. Today* 29, 538–543. doi: 10.1016/j.nedt.2008.12.003

Karyotaki, E., Cuijpers, P., Albor, Y., Alonso, J., Auerbach, R. P., Bantjes, J., et al. (2020). Sources of stress and their associations with mental disorders among college students: results of the World Health Organization World Mental Health Surveys International College Student Initiative. *Front. Psychol.* 11, 1759. doi: 10.3389/fpsyg.2020.01759

Kecojevic, A., Basch, C. H., Sullivan, M., and Davi, N. K. (2020). The impact of the COVID-19 epidemic on mental health of undergraduate students in New Jersey, cross-sectional study. *PLoS ONE* 15, e0239696. doi: 10.1371/journal.pone.0239696

Ketchen Lipson, S., Gaddis, S. M., Heinze, J., Beck, K., and Eisenberg, D. (2015). Variations in student mental health and treatment utilization across US Colleges and Universities. *J Am. Coll. Health* 63, 388–396. doi: 10.1080/07448481.2015.1040411

Kodish, T., Lau, A. S., Gong-Guy, E., Congdon, E., Arnaudova, I., Schmidt, M., et al. (2022). Enhancing racial/ethnic equity in college student mental health through innovative screening and treatment. *Adm. Policy Ment. Health* 49, 267–282. doi: 10.1007/s10488-021-01163-1

Kost, R. G., and de Rosa, J. C. (2018). Impact of survey length and compensation on validity, reliability, and sample characteristics for ultrashort-, short-, and long-research participant perception surveys. *J. Clin. Transl. Sci.* 2, 31–37. doi: 10.1017/cts.2018.18

Koushede, V., Lasgaard, M., Hinrichsen, C., Meilstrup, C., Nielsen, L., Rayce, S. B., et al. (2019). Measuring mental well-being in Denmark: validation of the original and short version of the Warwick-Edinburgh mental well-being scale (WEMWBS and SWEMWBS) and cross-cultural comparison across four European settings. *Psychiatry Res.* 271, 502–509. doi: 10.1016/j.psychres.2018.12.003

Krosnick, J. A., Holbrook, A. L., Berent, M. K., Carson, R. T., Michael Hanemann, W., Kopp, R. J., et al. (2002). The impact of "no opinion" response options on data quality: non-attitude reduction or an invitation to satisfice? *Public Opin. Q.* 66, 371–403. doi: 10.1086/341394

Lakens, D. (2013). Calculating and reporting effect sizes to facilitate cumulative science: a practical primer for t-tests and ANOVAs. *Front. Psychol.* 4, 863. doi: 10.3389/fpsyg.2013.00863

Lally, M., and Valentine-French, S. (2019). *Chapter 7: Emerging and Early Adulthood. Lifespan Development: A Psychological Perspective. 2nd Edn*. p.246-306). [E-book] San Francisco: Creative Commons. Available online at: http://dept.clcillinois.edu/psy/LifespanDevelopment.pdf (accessed February 6, 2022).

Lazarus, R. S., and Folkman, S. (1984). *Stress, Appraisal, and Coping*. New York, NY: Springer.

Lee, J., Jeong, H. J., and Kim, S. (2021). Stress, anxiety, and depression among undergraduate students during the COVID-19 pandemic and their use of mental health services. *Innovat. High. Educ.* 1–20. doi: 10.1007/s10755-021-09552-y

Lesure-Lester, G. E., and King, N. (2004). Racial-ethnic differences in social anxiety among college students. *J. Coll. Stud. Retent. Res. Theory Pract.* 6, 359–367. doi: 10.2190/P5FR-CGAH-YHA4-1DYC

Li, H., and Lin, C. (2003). College stress and psychological well-being of Chinese college students. *Acta Psychol. Sinca* 25, 222–230.

Lipson, S. K., Kern, A., Eisenberg, D., and Breland-Noble, A. M. (2018). Mental health disparities among college students of color. *J. Adolesc. Health* 63, 348–356. doi: 10.1016/j.jadohealth.2018.04.014

Lipson, S. K., Raifman, J., Abelson, S., and Reisner, S. L. (2019). Gender minority mental health in the U.S.: results of a National Survey on College Campuses. *Am. J. Prev. Med.* 57, 293–301. doi: 10.1016/j.amepre.2019.04.025

Liu, C. H., Stevens, C., Wong, S., Yasui, M., and Chen, J. A. (2019). The prevalence and predictors of mental health diagnoses and suicide among U.S. college students: implications for addressing disparities in service use. *Depress. Anxiety* 36, 8–17. doi: 10.1002/da.22830

Liu, X., Ping, S., and Gao, W. (2019). Changes in undergraduate students' psychological well-being as they experience University Life. *Int. J. Environ. Res. Public Health* 16, 2864. doi: 10.3390/ijerph16162864

Lopes, A. R., and Nihei, O. K. (2021). Depression, anxiety and stress symptoms in Brazilian university students during the COVID-19 pandemic: predictors and association with life satisfaction, psychological well-being and coping strategies. *PLoS ONE* 16, e0258493. doi: 10.1371/journal.pone.0258493

Margraf, J., Zhang, X. C., Lavallee, K. L., and Schneider, S. (2020). Longitudinal prediction of positive and negative mental health in Germany, Russia, and China. *PLoS ONE* 15, e0234997. doi: 10.1371/journal.pone.0234997

Matud, M. P., Díaz, A., Bethencourt, J. M., and Ibáñez, I. (2020). Stress and psychological distress in emerging adulthood: a gender analysis. *J. Clin. Med.* 9, 2859. doi: 10.3390/jcm9092859

McQuaid, R. J., Cox, S., Ogunlana, A., and Jaworska, N. (2021). The burden of loneliness: implications of the social determinants of health during COVID-19. *Psychiatry Res.* 296, 113648. doi: 10.1016/j.psychres.2020.113648

Miller, S. M. (1981). Predictability and human stress: toward a clarification of evidence and theory. *Adv. Exp. Soc. Psychol.* 14, 203–256. doi: 10.1016/S0065-2601(08)60373-1

Misra, R., and Castillo, L. G. (2004). Academic stress among college students: comparison of American and International Students. *Int. J. Stress Manag.* 11, 132–148. doi: 10.1037/1072-5245.11.2.132

Misra, R., and McKean, M. (2000). College students' academic stress and its relation to their anxiety, time management, and leisure satisfaction. *Am. J. Health Stud.* 16, 41–51.

Misra, R., McKean, M., West, S., and Russo, T. (2000). Academic stress of college students: Comparison of student and faculty perceptions. *Coll. Stud. J.* 34, 236–245.

Molla Jafar, H., Salabifard, S., Mousavi, S. M., and Sobhani, Z. (2015). The effectiveness of group training of CBT-based stress management on anxiety, psychological hardiness and general self-efficacy among university students. *Glob. J. Health Sci.* 8, 47–54. doi: 10.5539/gjhs.v8n6p47

Negga, F., Applewhite, S., and Livingston, I. (2007). African American college students and stress: school racial composition, self-esteem and social support. *Coll. Stud. J. 41*, 823.

Pascoe, M. C., Hetrick, S. E., and Parker, A. G. (2020). The impact of stress on students in secondary school and higher education. *Int. J. Adolesc. Youth* 25, 104–112. doi: 10.1080/02673843.2019.1596823

Patsali, M. E., Mousa, D. V., Papadopoulou, E., Papadopoulou, K., Kaparounaki, C. K., Diakogiannis, I., et al. (2020). University students' changes in mental health status and determinants of behavior during the COVID-19 lockdown in Greece. *Psychiatry Res.* 292, 113298. doi: 10.1016/j.psychres.2020.113298

Pedrelli, P., Nyer, M., Yeung, A., Zulauf, C., and Wilens, T. (2015). College students: mental health problems and treatment considerations. *Acad. Psychiatry* 39, 503–511. doi: 10.1007/s40596-014-0205-9

Perrewé, P. L., and Zellars, K. L. (1999). An examination of attributions and emotions in the transactional approach to the organizational stress process. *J. Org. Behav.* 20, 739–752. doi: 10.1002/(SICI)1099-1379(199909)20:5<739::AID-JOB1949>3.0.CO;2-C

Phang, C. K., Mukhtar, F., Ibrahim, N., Keng, S. L., and Mohd Sidik, S. (2015). Effects of a brief mindfulness-based intervention program for stress management among medical students: the Mindful-Gym randomized controlled study. *Adv. Health Sci. Educ. Theory Pract.* 20, 1115–1134. doi: 10.1007/s10459-015-9591-3

Posselt, J. R., and Lipson, S. K. (2016). Competition, anxiety, and depression in the college classroom: variations by student identity and field of study. *J. Coll. Stud. Dev.* 57, 973–989. doi: 10.1353/csd.2016.0094

Prowse, R., Sherratt, F., Abizaid, A., Gabrys, R. L., Hellemans, K., Patterson, Z. R., et al. (2021). Coping with the COVID-19 pandemic: examining gender differences in stress and mental health among university students. *Front. Psychiatry* 12, 650759. doi: 10.3389/fpsyt.2021.650759

Reddy, K. J., Menon, K. R., and Thattil, A. (2018). Academic stress and its sources among university students. *Biomed Pharmacol J* 11, 1. doi: 10.13005/bpj/1404

Regehr, C., Glancy, D., and Pitts, A. (2013). Interventions to reduce stress in university students: a review and meta-analysis. *J. Affect. Disord.* 148, 1–11. doi: 10.1016/j.jad.2012.11.026

Ringdal, R., Bradley Eilertsen, M. E., Bjørnsen, H. N., Espnes, G. A., and Moksnes, U. K. (2018). Validation of two versions of the Warwick-Edinburgh Mental Well-Being Scale among Norwegian adolescents. *Scand. J. Public Health* 46, 718–725. doi: 10.1177/1403494817735391

Roberts, C., Gilbert, E., Allum, N., and Eisner, L. (2019). Research synthesis: Satisficing in surveys: a systematic review of the literature. *Public Opin. Q.* 83, 598–626. doi: 10.1093/poq/nfz035

Romeo, R. D., Patel, R., Pham, L., and So, V. M. (2016). Adolescence and the ontogeny of the hormonal stress response in male and female rats and mice. *Neurosci. Biobehav. Rev.* 70, 206–216. doi: 10.1016/j.neubiorev.2016.05.020

Ruthig, J. C., Haynes, T. L., Stupnisky, R. H., and Perry, R. P. (2009). Perceived Academic Control: mediating the effects of optimism and social support on college students' psychological health. *Soc. Psychol. Educ.* 12, 233–249. doi: 10.1007/s11218-008-9079-6

Ryan, R. M., and Deci, E. L. (2001). On happiness and human potentials: a review of research on hedonic and eudaimonic well-being. *Annu. Rev. Psychol.* 52, 141–166. doi: 10.1146/annurev.psych.52.1.141

Saleh, D., Camart, N., and Romo, L. (2017). Predictors of stress in college students. *Front. Psychol.* 8, 19. doi: 10.3389/fpsyg.2017.00019

Salerno, J. P., Williams, N. D., and Gattamorta, K. A. (2020). LGBTQ populations: psychologically vulnerable communities in the COVID-19 pandemic. *Psychol. Trauma* 12, S239–S242. doi: 10.1037/tra0000837

Scales, P. C., Benson, P. L., Oesterle, S., Hill, K. G., Hawkins, J. D., and Pashak, T. J. (2015). The dimensions of successful young adult development: a conceptual and measurement framework. *Appl. Dev. Sci.* 20, 150–174. doi: 10.1080/10888691.2015.1082429

Schneiderman, N., Ironson, G., and Siegel, S. D. (2005). Stress and health: psychological, behavioral, and biological determinants. *Annu. Rev. Clin. Psychol.* 1, 607–628. doi: 10.1146/annurev.clinpsy.1.102803.144141

Schönfeld, P., Brailovskaia, J., Bieda, A., Zhang, X. C., and Margraf, J. (2016). The effects of daily stress on positive and negative mental health: mediation through self-efficacy. *Int. J. Clin. Health Psychol.* 16, 1–10. doi: 10.1016/j.ijchp.2015.08.005

Shah, N., Cader, M., Andrews, B., McCabe, R., and Stewart-Brown, S. L. (2021). Short Warwick-Edinburgh Mental Well-being Scale (SWEMWBS): performance in a clinical sample in relation to PHQ-9 and GAD-7. *Health Qual. Life Outcomes* 19, 260. doi: 10.1186/s12955-021-01882-x

Shanahan, M. J. (2000). Pathways to adulthood in changing societies: variability and mechanisms in life course perspective. *Annu. Rev. Sociol.* 26, 667–692. doi: 10.1146/annurev.soc.26.1.667

Skalski, S. B., Konaszewski, K., Büssing, A., and Surzykiewicz, J. (2022). Resilience and mental well-being during the COVID-19 pandemic: serial mediation by persistent thinking and anxiety about coronavirus. *Front. Psychiatry* 12, 810274. doi: 10.3389/fpsyt.2021.810274

Smith, K. M., Chesin, M. S., and Jeglic, E. L. (2014). Minority college student mental health: does majority status matter? Implications for college counseling services. *J. Multicult. Counsel. Dev.* 42, 77–92. doi: 10.1002/j.2161-1912.2014.00046.x

Son, C., Hegde, S., Smith, A., Wang, X., and Sasangohar, F. (2020). Effects of COVID-19 on college students' mental health in the United States: interview survey study. *J. Med. Internet Res.* 22, e21279. doi: 10.2196/21279

Spear, L. P. (2000). The adolescent brain and age-related behavioral manifestations. *Neurosci. Biobehav. Rev.* 24, 417–463. doi: 10.1016/S0149-7634(00)00014-2

Stewart-Brown, S., and Janmohamed, K. (2008). Warwick-Edinburgh mental well-being scale. User guide. Version, 1. doi: 10.1037/t80221-000

Suresh, R., Karkossa, Z., Richard, J., and Karia, M. (2021). Program evaluation of a student-led peer support service at a Canadian university. *Int. J. Ment. Health Syst.* 15, 54. doi: 10.1186/s13033-021-00479-7

Surzykiewicz, J., Konaszewski, K., Skalski, S., Dobrakowski, P. P., and Muszyńska, J. (2021). Resilience and mental health in the polish population during the COVID-19 lockdown: a mediation analysis. *J. Clin. Med.* 10, 4974. doi: 10.3390/jcm10214974

Syed, N. B. (2021). Impact of levels of education on perceived academic stress and mental wellbeing: an investigation into online mode of learning during pandemic. *J. Psychol. Res.* 3, 12–18. doi: 10.30564/jpr.v3i2.3032

Taber, K. S. (2018). The use of Cronbach's alpha when developing and reporting research instruments in science education. *Res. High. Educ.* 48, 1273–1296. doi: 10.1007/s11165-016-9602-2

Team Prolific (2018). *What Are the Advantages and Limitations of an Online Sample?* Prolific Researcher Help Centre. Available online at: https://researcher-help.prolific.co/hc/en-gb/articles/360009501473-What-are-the-advantages-and-limitations-of-an-online-sample-#:$\sim$:text=Limitations%20Rapid-responder%20bias.%20Prolific%20predominantly%20uses%20convenience%20sampling%2C,and%20fairly%20distribute%20study%20places%20among%20active%20participants (accessed February 22, 2022).

Tennant, R., Hiller, L., Fishwick, R., Platt, S., Joseph, S., Weich, S., et al. (2007). The Warwick-Edinburgh Mental Well-being Scale (WEMWBS): development and UK validation. *Health Qual. Life Outcomes* 5, 63. doi: 10.1186/1477-7525-5-63

Thorne, N., Witcomb, G. L., Nieder, T., Nixon, E., Yip, A., and Arcelus, J. (2018). A comparison of mental health symptomatology and levels of social support in young treatment seeking transgender individuals who identify as binary and non-binary. *Int. J. Transgender.* 20, 241–250. doi: 10.1080/15532739.2018.1452660

Toscos, T., Carpenter, M., Drouin, M., Roebuck, A., Kerrigan, C., and Mirro, M. (2018). College students' experiences with, and willingness to use, different types of telemental health resources: do gender, depression/anxiety, or stress levels matter? *Telemed. J. E Health* 24, 998–1005. doi: 10.1089/tmj.2017.0243

Trout, I. Y., and Alsandor, D. J. (2020). Graduate student well-being: learning and living in the US during the COVID-19 pandemic. *Int. J. Multidiscipl. Perspect. High. Educ.* 5, 150–155 doi: 10.32674/jimphe.v5i1.2576

Verma, R., Balhara, Y. P., and Gupta, C. S. (2011). Gender differences in stress response: role of developmental and biological determinants. *Ind. Psychiatry J.* 20, 4–10. doi: 10.4103/0972-6748.98407

Wheaton, B. (1985). Models for the stress-buffering functions of coping resources. *J. Health Soc. Behav.* 26, 352–364. doi: 10.2307/2136658

Wyatt, T. J., Oswalt, S. B., and Ochoa, Y. (2017). Mental health and academic performance of first-year college students. *Int. J. High. Educ.* 6,178–187. doi: 10.5430/ijhe.v6n3p178

Yang, C., Chen, A., and Chen, Y. (2021). College students' stress and health in the COVID-19 pandemic: the role of academic workload, separation from school, and fears of contagion. *PLoS ONE* 16, e0246676. doi: 10.1371/journal.pone.0246676

Yusufov, M., Nicoloro-SantaBarbara, J., Grey, N. E., Moyer, A., and Lobel, M. (2019). Meta-analytic evaluation of stress reduction interventions for undergraduate and graduate students. *Int. J. Stress Mang.* 26, 132–145. doi: 10.1037/str0000099

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Musical extracurricular activities and adjustment among children from immigrant families: A 2-year quasi-experimental study

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This quasi-experimental study examines the impact on emotional/behavioral functioning (hyperactivity-inattention and internalizing symptoms) and school experiences (school engagement, positive experience in school) of *La classe enchantée*, a high-quality, non-selective extracurricular music program. Based on the program's objectives and on the positive youth development model, it was anticipated that elementary school students participating in *La classe enchantée* would evolve more favorably in terms of these outcomes over the 2-year duration of the program spanning Grades 4 and 5, compared to non-participating schoolmates. The sample includes 72 children (25% in the intervention group, 47% girls, 93% first/second generation immigrants) from one low-income school, followed over 2 years starting in grade four (M_{age} = 9.30, *SD* = 0.49). Latent Growth Curve models show that, compared to classmates not in the program, children in *La classe enchantée* progressed more favorably over time on self-reported measures of internalizing symptoms and positive experiences in school. For teacher-rated hyperactivity-inattention and school engagement, the slopes indicated stability over time in both groups, although hyperactivity-inattention tended to improve among those with relatively high initial levels in the intervention group. These results suggest that engagement in quality musical extracurricular activities might boost emotional and school well-being and potentially reduce hyperactivity-inattention among a specific subgroup of children from immigrant families.

KEYWORDS

extracurricular activities, music, psychosocial outcomes, immigration, program evaluation

Introduction

Learning to play a music instrument is valuable in and of itself. Yet, besides its intrinsic value, it has long been argued that musical skill development among children might generate developmental benefits in other domains, through "transfer" processes (Hallam, 2015; Sala and Gobet, 2017; Swaminathan and Schellenberg, 2021). Learning music requires complex executive functions like attention and memory, as well as an understanding of mathematical concepts like fractions to grasp beats and musical notation. Thus, music instruction could support cognitive functioning and academic learning (Swaminathan and Schellenberg, 2021). This intuition has generated much empirical research, including experimental and quasi-experimental evaluations of music instruction programs. According to recent meta-analyses, it appears, however, that music education in school may not significantly improve cognitive outcomes like academic grades, working memory, or IQ scores in the general population of children (Sala and Gobet, 2017; Cooper, 2020), although the question is not settled and continues to be examined from new angles (e.g., Frischen et al., 2021).

The general focus on cognitive outcomes and neurological processes may have obscured some of the potential benefits of music instruction for children and youth. Learning music involves much more than learning to play an instrument, perhaps especially when learning occurs in an after-school, extracurricular setting involving group activities like orchestra and choral singing. According to the positive youth development perspective, learning music in such a context, through extracurricular activities (ECAs), offers opportunities to enjoy positive experiences and to develop personal strengths, like a sense of competence and connection to larger communities and institutions (notably to school), which in turn supports emotional and behavioral functioning (Lerner et al., 2015; Vandell et al., 2015). However, these psychosocial outcomes have received scant research attention in the specialized music literature. To illustrate, in a recent review of research linking music education and children and youth outcomes (Dumont et al., 2017), only 8 of the 46 reviewed studies measured impacts on social, emotional, or psychosocial functioning (Kirschner and Tomasello, 2010; Pelham et al., 2011; Rickard et al., 2012, 2013; Schellenberg and Mankarious, 2012; Ritblatt et al., 2013; Degé et al., 2014; Schellenberg et al., 2015). These studies yielded mixed results, which is not surprising given wide differences in terms of developmental periods (toddlerhood to adolescence), types of music interventions (e.g., listening to music while doing other tasks, individual instrument instruction, choral singing), settings (in-school compulsory classes, extracurricular), duration (from a few sessions to a year), outcomes (e.g., depression, self-esteem, in-class behavior, attitudes toward school, pro-social skills), sample sizes (ranging between 52 and 195), and study design (correlational, quasi-experimental, experimental).

These studies were consistent in one respect, however: their lack of attention to children from diverse backgrounds in general, and from immigrant backgrounds in particular (for a similar argument, see Holochwost et al., 2017; Christensen, 2022). Yet, insights from qualitative studies suggest that music programs might fostering inclusion and a sense of belonging among children from immigrant families, whether first (born outside the host country) or second generation (born in the host country), who may particularly benefit from opportunities to communicate and express themselves non-verbally through music. This may be especially so for those whose mother tongue differs from the majority language (Marsh, 2012, 2017). Correlational findings from the literature on extracurricular activities in general (i.e., not focusing specifically on music) also suggest that children from immigrant families might particularly benefit from ECA involvement, although this potential is left significantly unfulfilled, as children from immigrant families participate comparatively less than their non-immigrant peers (Simpkins et al., 2013; Camacho and Fuligni, 2015; Lerner et al., 2017; Meier et al., 2018). Non-participation is further compounded for children from low-SES backgrounds or for those who are less well-adjusted in school in general (McCabe et al., 2020).

To address the noted gaps in the literature, the present study proposes a quasi-experimental evaluation of the impact of a high-quality, non-selective music ECA program offered over 2 years on the school experiences and emotional and behavioral outcomes of children attending a school almost exclusively serving first- and second-generation immigrant children. The evaluation focuses on outcomes similar to those used in previous studies, and includes indicators of positive functioning (i.e., positive school experiences, school engagement) and of difficulties or challenges (i.e., internalizing problems, hyperactivity-inattention) that might be promoted or improved through participation in the program.

School engagement is a construct generally understood to refer to students' active investment and involvement in school, which usually includes behavioral, affective, and cognitive components (Archambault I. et al., 2019). In this study, only the behavioral component was considered, namely children's engagement in classroom work. Concerning positive school experiences, they mostly refer to the children's feelings of excitement and motivation about school. Internalizing problems and hyperactivity-inattention capture two major poles of student socio-emotional functioning and refer to difficulties that are relatively common among school-age children, including in non-clinical samples (Caspi et al., 2014; Achenbach et al., 2016). Internalizing problems refer mainly to symptoms of depression and anxiety, such as worry, sadness, and a negative mood (Garber and Rao, 2014; Vasey et al., 2014). Hyperactivity-inattention encompasses problematic behaviors

such as impulsivity, restlessness, and difficulties concentrating on a task (Campbell et al., 2014).

These outcomes were assessed *via* either self-reports for emotional aspects usually best captured from children's own points of view (i.e., internalizing problems, positive school experiences) or teacher-rated measures for behavioral aspects easily observed in the classroom (i.e., hyperactivity-inattention and behavioral engagement in academic work; De Los Reyes et al., 2015).

Music activities and psychosocial outcomes: Insights from a positive youth development lens

Besides pointing to the need to consider outcomes beyond cognitive functioning, the general literature on ECA underscores multiple factors shaping the potential benefits of music instruction (Eccles and Gootman, 2002; Vandell et al., 2015; Deutsch et al., 2017). In this literature, largely conducted within Lerner's positive youth development perspective (Lerner et al., 2015), ECAs are defined as non-compulsory organized activities that occur regularly, take place outside of regular school hours, are adult led, involve peers, and focus on a single endeavor, like a sport or performing art. According to the positive youth development model, the psychosocial benefits of ECA, musical or otherwise, are not guaranteed, and are thought to depend on factors like the ECA's quality, setting, and dosage (Simpkins, 2015). Providing optimal experiences along those lines might be particularly crucial for programs serving children and youth for whom access to excellent ECA programming is limited, such as those from immigrant backgrounds (Camacho and Fuligni, 2015; Park et al., 2015; Smith et al., 2017; Heath et al., 2018).

Extracurricular activities quality

Many authors emphasize that offering quality ECA capable of fostering positive development is complex and requires many ingredients (Eccles and Templeton, 2002; Hirsch et al., 2011; Larson et al., 2015; Roth and Brooks-Gunn, 2016; Fredricks et al., 2017). For ECA to be considered high-quality, it is crucial that participants experience healthy, supportive relationships with activity leaders and peers. In addition, quality ECAs offer individuals opportunities to develop their skills *via* intentional learning experiences and provide the group experiences supporting teamwork and the development of a shared sense of belonging. Quality ECAs also balance structure and autonomy. Adequately structured ECAs offer carefully planned, engaging, challenging activities scaffolded according to developmental needs, while also providing participants space to exert autonomy and make choices. Quality ECAs also offer youth occasion to build their leadership in the group and outside of it, through contributions to the broader community, for instance through public performances (Smith et al., 2010; Deutsch et al., 2017). This "real-life contribution in authentic settings" feature might be especially important in bringing children from immigrant families to positively engage in ECA (Heath et al., 2018), as these settings provide a unique opportunity for them to learn about the norms and expectations of their host society.

Extracurricular activities setting

Extracurricular activities are typically either community-based or school-based. Activities offered by community-based organizations can still be planned in close collaboration with schools (Hirsch et al., 2011). For instance, school staff can directly promote certain activities or invite community-organization staff to promote specific activities on the school premises. Schools can also provide venues and equipment for activities, whether or not they are directly in charge of managing them. Coordination with school staff appears particularly important for recruiting children and youth from immigrant backgrounds in ECA, as well as youth with learning, behavioral, or emotional difficulties, who also tend to participate less in ECA (Heath et al., 2018; McCabe et al., 2020). Such coordination may also facilitate the generalization of eventual positive impacts of ECA on outcomes observable in the classroom, like behavioral engagement in class.

Extracurricular activities dosage

Even ECA of the highest quality and offered in ideal settings may not yield benefits if children are insufficiently exposed. Dosage usually refers to both intensity and duration, which are often captured in the form of hours per week and years of continuous practice, respectively (Simpkins, 2015; Vandell et al., 2015). There are no clear guidelines regarding optimal dosage, but some findings suggest that significant impacts might require a minimum total exposure of around 45 h, and that programs lasting at least 2 years are associated with effect sizes many times larger than programs lasting a year or less (Reisner et al., 2004; Lauer et al., 2006; Roth et al., 2010; synthesized in Vandell et al., 2015). Similar dose-response patterns have been reported in studies specifically focused on music education (e.g., Holochwost et al., 2017; Knaus, 2021).

La classe enchantée: A high-quality music extracurricular activities program

La classe enchantée embodies many of the quality, setting, and dosage features recommended for ECA programs just discussed. The program results from a partnership between the youth community outreach branch of the Faculty of Music of the Université de Montréal (*L'École des jeunes de la Faculté de musique de l'Université de Montréal*) and the Montreal

school board (*Centre de service scolaire de Montréal*). The explicit goal of the program is to improve access to high-quality classical music instruction by offering non-selective music ECA to children attending primary public schools located in neighborhoods with high concentrations of low-income immigrant families. To achieve this goal and reach children who do not typically participate in classical music ECA (e.g., children with less advantaged academic or psychosocial profiles; Vandell et al., 2015), recruitment efforts unfold in close collaboration with local schools and include special in-person exchanges to present the program and encourage children to participate regardless of their past music experiences, academic grades, or psychosocial profiles. The program is also offered at low (and sometimes no) cost, with fees adjusted according to families' financial means. Also, the instruments are loaned for free to the participating children, who assume responsibility for taking good care of their instrument for the duration of the program.

In terms of dosage, the program offers weekly three-hour sessions offered during the weekend over multiple school years. The sessions include many "ingredients" of high-quality programming. They include instrument instruction in small subgroups as well as larger orchestral and choral activities, all involving students attending the same school. In a typical weekly session, students start with instrument instruction (e.g., harp instruction) in small groups of about five students playing the same instrument. Then, all subgroups (usually three) from the same grade (e.g., 4th grade students) participate in a session of auditory training together. Then, the weekly session ends with choral singing and orchestra practice, in which all the students involved in *La classe enchantée* participate, regardless of their grade level (typically, about 35 to 45 students; for more details, see Milette, 2021).

Even though the program activities are highly structured, participants also have opportunities to make significant choices. Notably, they can experiment with diverse instruments before choosing the one they want to learn. The program also provides meaningful opportunities to perform in public events at the participants' school and in the larger community. To foster supportive, healthy relationships within the program, the activity leaders in charge of implementation (undergraduate music students) are carefully selected, trained, and supported by professional music educators from the community outreach branch of the Faculty of Music of the Université de Montréal. The program staff are also in regular contact with school personnel (e.g., teachers, psychosocial practitioners) and parents, to adapt their approach to students' individual profiles and needs. A qualitative evaluation of the program confirmed that all the stakeholders involved, including the children and their families, experienced the program positively and considered that it fostered positive and supportive relationships both with peers and with the program staff (Authors, submitted).

Objectives and hypotheses

The goal of this study is to assess the efficacy of *La classe enchantée* in increasing positive adjustment in school and decreasing adjustment problems among children from immigrant backgrounds. More specifically, it aims to assess changes in two indicators of positive adjustment (positive school experiences and engagement) and two indicators of psychosocial adjustment problems (internalizing behaviors and hyperactivity-inattention) among children participating in *La classe enchantée*, while comparing these changes to those reported by classmates in the control group. To do so, this study followed students from one primary school across two consecutive school years (grades 4 and 5), including those who did (intervention group) and did not (control group) choose to participate in the program.

Based on the positive youth development model, we anticipated that students participating in *La classe enchantée* and their teachers would either report improved or stable school experiences, whereas those from the control group would report a slight decline, based on well-documented general declining trends for these outcomes over the primary school years (see Archambault I. et al., 2019). We also anticipated that children participating in *La classe enchantée* would experience a slight decrease in their internalizing behaviors and hyperactivity-inattention, whereas those levels would remain stable in the control group, as usually found in this age group (Campbell et al., 2014; Vasey et al., 2014). Besides levels of changes, we expected that the initial levels of these indicators should be similar across groups, since the general tendency for children with more advantaged academic and psychosocial profiles to participate more in ECA (Vandell et al., 2015) should be offset by the explicit commitment embedded in *La classe enchantée* to recruit atypical participants in the program.

Materials and methods

Participants

Participants include 72 students from one school, followed from the beginning of their fourth grade to the end of their fifth grade. Among those, 18 (25.0%) participated in *La classe enchantée*, and 54 (75.0%) composed the control group. At the beginning of the study, students were between 8 and 10 years old (M = 9.30, SD = 0.49; 46.5% girls). Almost all (93%) were of immigrant background (47.9% first generation born outside Canada, 45.1% second generation born in Canada from parents born outside the country, and 7.0% of parents also born in Canada). A majority (74.6%) lived with both parents, whereas 25.4% lived in other family configurations (e.g., joint custody, mother only, father only, mother and her partner, father and his partner, other).

Procedures

The pilot version of *La classe enchantée* evaluated in the present study was implemented in one public primary school adjacent to the Université de Montréal's campus. At the time of data collection, the school's catchment area was considered low-income according to the official provincial Ministry of Education classification system (the school was ranked at the last decile position, indicating a concentration of low-income family in the school's catchment at or above the 90th percentile; Ministry of Education, 2017).

Recruitment for the program took place in the fall of 2017, on the primary school premises. The program staff presented *La classe enchantée* to fourth-grade students and their parents while underscoring its non-selective nature and the possibility for students to participate regardless of past music experience or profiles in terms of grades, behavior, etc. Recruitment for the research project was launched a few weeks later, after obtaining independent approval from both the Université de Montréal's IRB and the school board ethics committee (approval number: #CERAS-2017-18-073-D). All fourth-grade students (from three classrooms) were invited to participate in the research project, regardless of whether they participated in the program. To ensure renewed, ongoing consent, consent procedures were repeated a year later at the beginning of fifth grade. Consent to participate in the research project was obtained for all the students involved in *La classe enchantée*. In the control group, 18% of the families refused to participate in fourth grade. It turned out that some families initially refused to participate because they mistakenly thought that consent was required only for those involved in the program. Thus, some who had initially refused consented to participate the next year in fifth grade, and thus provided at least partial data (see section "Missing data").

The musical activities started in January 2018 and continued until the end of that school year (June 2019), and then resumed the following school year (September 2019-June 2020). Data collection waves took place twice a year, and involved all participating students (i.e., *La classe enchantée* and Control group) and their homeroom teachers. Specifically, data collection waves took place in November 2017 (pretest T1), May 2018 (T2), December 2018 (T3), and June 2019 (T4).

Missing data

Missing data was due either to attrition (i.e., participants lost during the study, often because of residential mobility) or students or their teachers not answering a particular questionnaire (i.e., a student absent on the day of data collection or a teacher not returning a questionnaire to the research team). In terms of attrition, one participant from the control group was lost after T1, and 19 participants were lost after T2 (17 from the control group and 2 from *La classe enchantée*). Overall, missing data (due to attrition or not answering the questionnaire) was as follows: 19.4% at T1, 20.8% at T2, 29.2% at T3, and 29.2% at T4. Comparing students without and with missing data across time points revealed more missing data among those from the control group ($\chi^2 = 10.667$, $df = 1$, $p = 0.001$) and students not born in Canada ($\chi^2 = 6.199$, $df = 1$, $p = 0.013$). However, missing data was not related to gender, age, or family structure. Having missing data was associated with neither student-reported nor teacher-reported measures, except for a positive association found between having missing data and teacher-reported behavioral engagement at T1 ($r = 0.381$, $p = 0.003$) and T2 ($r = 0.285$, $df = 1$, $p = 0.032$). Missing data was handled using Mplus (Muthén and Muthén, 2017) Full Information Maximum Likelihood (Enders, 2010).

Measures

Sociodemographic characteristics

Students reported their gender (0 = girl; 1 = boy), their age in years (8 to 10 years old), their immigration status (0 = born in Canada [almost always from parents born outside the country]; 1 = born elsewhere), and their family structure (0 = living with both parents; 1 = else).

Student-rated internalizing behaviors

Students rated their internalizing behaviors on anxiety and depression items from the French adaptation (Tremblay et al., 1987) of the *Preschool Behavior Questionnaire* (Hoge et al., 1985). This questionnaire was initially developed for kindergarten students, but has been shown to be valid across the primary school years (Tremblay et al., 1987); as such, it has often been used with older school-age children, including during the later elementary school years (e.g., Olivier et al., 2020). Students responded to this 6-item scale (e.g., "You worry a lot" and "You are unhappy or sad"; $\alpha_{T1} = 0.694$, $\alpha_{T2} = 0.825$, $\alpha_{T3} = 0.859$, $\alpha_{T4} = 0.895$) on a response scale ranging from 1 (*not true*) to 3 (*certainly true*).

Student-rated positive experiences at school

Students rated four items from the "zest" subscale of the *Positive Experiences at School Scale* (Furlong et al., 2013). This scale captures positive attitudes toward school, like excitement, enthusiasm, and energy, through items like "I wake up in the morning excited to go to school," "I get really excited about my school projects," rated on a response scale ranging from 1 (*almost never*) to 3 (*very often*). As a French validation of this scale has not yet been published, the research team conducted preliminary analyses to verify the quality of its psychometric properties. The translated version showed good

internal consistency (e.g., $\alpha_{T1} = 0.762$, $\alpha_{T2} = 0.829$, $\alpha_{T3} = 0.823$, $\alpha_{T4} = 0.815$).

Teacher-reported hyperactivity-inattention

Teachers reported each of their students' hyperactivity-inattention levels using one subscale from the *Strengths and Difficulties Questionnaire* (Goodman, 2001) adapted in French (Capron et al., 2007). They responded to this 9-item scale (e.g., "This student is restless, overactive, cannot stay still for long" and "This student is inattentive"; $\alpha_{T1} = 0.943$, $\alpha_{T2} = 0.944$, $\alpha_{T3} = 0.951$, $\alpha_{T4} = 0.918$) on a response scale ranging from 1 (*not true*) to 3 (*certainly true*).

Teacher-reported behavioral engagement

Teachers reported each of their students' behavioral engagement levels in the classroom using a scale developed in French for the Quebec Longitudinal Study of Child Development (Pagani et al., 2010). Teachers responded to this 9-item scale (e.g., "This student puts a lot of effort in assignments" and "This student participates in class"; $\alpha_{T1} = 0.811$, $\alpha_{T2} = 0.851$, $\alpha_{T3} = 0.858$, $\alpha_{T4} = 0.849$) on a response scale ranging from 1 (*never*) to 3 (*often*).

Data analysis

Preliminary analyses included assessing whether students enlisted in *La classe enchantée* differed from the control group in terms of sociodemographic characteristics, as well as assessing correlations between all study variables. Using Mplus 8.4 (Muthén and Muthén, 2017), we then conducted Latent Growth Curve analysis (LGC, including intercept and linear slope) to assess changes in school experiences (positive school experiences and behavioral engagement) and behavior problems (internalizing behaviors and hyperactivity-inattention) across the two school years (T1 to T4) in both the *La classe enchantée* and control groups. LGC analysis is useful for examining group differences in program evaluations involving long-term follow-ups and multiple measures (e.g., Beauchaine et al., 2005; Liddle et al., 2009; Eddy et al., 2021).

To determine whether students from the two groups followed distinct developmental trajectories, we first assessed a model in which all parameters varied between groups and then progressively constrained them to equality across groups using the following sequence: (1) model freely estimated, (2) fixed intercept mean, (3) fixed intercept variance, (4) fixed slope mean, (5) fixed slope variance, and (6) fixed intercept-slope covariance. These models were compared using a chi-square difference test calculated using the Satorra-Bentler correction (Satorra and Bentler, 2010). When significant, this test indicates the presence of a difference on the constrained parameter between groups, as a result of which we retained the previous model (i.e., kept the parameter freely estimated between groups in the following models).

Model fit was assessed using the chi-square statistic (χ^2), the Comparative Fit Index (CFI), the Tucker-Lewis Index (TLI), and the Root Mean Square Error of Approximation (RMSEA) (Marsh et al., 2005). For the CFI and TLI, values above.90 and.95 respectively indicate an acceptable and excellent model fit. For the RMSEA, values smaller than.08 and.06 respectively suggest an acceptable and excellent fit (Browne and Cudeck, 1992; Schumacker and Lomax, 1996; Hu and Bentler, 1999).

Results

Preliminary analyses

Initial differences between groups

Comparing students who participated in *La classe enchantée* to those from the control group revealed no sociodemographic differences in proportions of boys and girls ($\chi^2 = 3.641$, $df = 1$, $p = 0.056$), of students born in Canada or elsewhere ($\chi^2 = 0.019$, $df = 1$, $p = 0.982$), of family structure ($\chi^2 = 0.024$, $df = 1$, $p = 0.877$), or of differences in mean age ($t = 0.531$, $df = 1$, $p = 0.597$). Similarly, according to descriptive statistics (mean and standard deviations) reported in **Table 1**, no differences between groups were found for self-reported internalizing problems or positive school experiences at T1. However, participating in *La classe enchantée* was associated with higher levels of teacher-reported hyperactivity-inattention and lower levels of behavioral engagement at T1. Thus, the few differences between the two groups were limited to teacher-reported measures, and indicated worse initial functioning in the intervention group as compared to the control group.

Other correlations

In **Table 1**, all significant associations were in the expected direction and indicated relative stability of the adjustment indicators across time points. Also, teachers' perceptions of their students' hyperactivity-inattention and behavioral engagement levels shared moderate to high correlations ($r = -0.510$ to -0.860), indicating that teachers tend to perceive the behavioral engagement of their students as closely tied to their hyperactivity-inattention levels.

Latent curve models

Model fit indices from the alternative Latent Curve Models are reported in **Table 2** and detailed parameter estimates are reported in **Supplementary Table 1** of the online **Supplementary material**. All models that were retained (those not in bold in **Table 1**) had an acceptable to an excellent level of fit.

TABLE 1 Correlations between study variables.

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
(1)	Program (0 = no)																					
(2)	Sex (0 = girl)	0.225																				
(3)	Age	0.063	0.079																			
(4)	Immigration (0 = no)	0.016	−0.082	−0.149																		
(5)	Family (0 = intact)	0.018	0.061	−0.204	−0.015																	
(6)	Internalizing T1	0.166	−0.050	0.104	−0.008	−0.027																
(7)	Internalizing T2	0.147	0.016	−0.156	0.155	−0.009	0.454*															
(8)	Internalizing T3	−0.039	−0.014	−0.288*	0.232	−0.040	0.294	0.595*														
(9)	Internalizing T4	−0.041	−0.022	−0.148	0.047	0.053	0.245	0.417*	0.556*													
(10)	Positive Exp. T1	0.003	0.120	0.186	−0.120	−0.129	−0.135	−0.074	0.090	−0.091												
(11)	Positive Exp. T2	−0.065	0.021	−0.121	−0.004	−0.039	0.116	−0.161	0.088	−0.012	0.445*											
(12)	Positive Exp. T3	0.236	−0.079	0.032	0.018	−0.133	−0.057	0.078	−0.218	−0.258	0.433*	0.557*										
(13)	Positive Exp. T4	0.278	−0.071	−0.022	0.226	−0.238	−0.024	0.119	0.121	−0.143	0.153	0.218	0.468*									
(14)	Hyper-Inatten. T1	0.384*	0.318*	0.046	−0.238	0.068	0.425*	0.180	0.028	−0.147	−0.167	0.087	0.181	0.199								
(15)	Hyper-Inatten. T2	0.314*	0.268*	−0.003	−0.084	0.054	0.454*	0.345*	0.113	−0.056	−0.143	0.094	−0.034	0.222	0.832*							
(16)	Hyper-Inatten. T3	0.379*	0.378*	0.102	−0.106	−0.069	0.407*	0.152	0.102	−0.022	−0.133	0.027	0.154	0.091	0.809*	0.785*						
(17)	Hyper-Inatten. T4	0.198	0.338*	0.189	−0.163	−0.017	0.331	0.038	0.147	0.052	0.042	0.164	0.076	−0.036	0.723*	0.599*	0.729*					
(18)	Engagement T1	−0.389*	−0.272*	−0.036	0.358*	−0.206	−0.263	−0.102	0.183	0.140	0.034	−0.076	−0.208	−0.200	−0.774*	−0.585*	−0.533*	−0.572*				
(19)	Engagement T2	−0.288*	−0.359*	0.030	0.166	−0.051	−0.485*	−0.322*	−0.052	0.119	0.215	0.039	0.202	−0.057	−0.671*	−0.819*	−0.725*	−0.584*	0.603*			
(20)	Engagement T3	−0.314*	−0.401*	−0.098	−0.017	0.198	−0.377*	−0.177	−0.161	0.000	0.266	0.095	−0.018	−0.109	−0.645*	−0.637*	−0.860*	−0.559*	0.448*	0.751*		
(21)	Engagement T4	−0.149	−0.239	−0.217	0.143	0.184	−0.323	−0.067	−0.089	−0.031	0.241	−0.017	−0.023	0.075	−0.572*	−0.510*	−0.741*	−0.767*	0.414*	0.581*	0.743*	
Mean							1.539	1.522	1.493	1.479	3.255	3.097	2.957	2.839	1.394	1.378	1.402	1.404	2.592	2.621	2.547	2.573
Standard Deviation							0.401	0.483	0.466	0.551	0.632	0.761	0.760	0.778	0.545	0.555	0.529	0.445	0.364	0.381	0.419	0.407
Minimum-Maximum							1–3	1–3	1–3	1–3	1–4	1–4	1–4	1–4	1–3	1–3	1–3	1–3	1–3	1–3	1–3	1–3

*$p < 0.05$.

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TABLE 2 Results from the alternative latent growth curve models.

Model	χ^2	*df*	SCF	CFI	TLI	RMSEA	Satorra-Bentler diff. test	
							$\Delta\chi^2$	*p*-Value
Student-Reported Internalizing Behaviors								
(1) Free	5.234	10	0.857	1.000	1.000	0.000		
(2) Fixed intercept mean	**8.525**	**11**	**0.805**	**1.000**	**1.000**	**0.000**	**8.484**	**0.004**
(3) Fixed intercept variance	5.744	11	0.821	1.000	1.000	0.000	0.500	0.480
(4) Fixed slope mean	**9.278**	**12**	**0.793**	**1.000**	**1.000**	**0.000**	**5.435**	**0.020**
(5) Fixed slope variance	6.140	12	0.821	1.000	1.000	0.000	0.395	0.530
(6) Fixed intercept-slope covariance	7.266	13	0.800	1.000	1.000	0.000	1.399	0.237
Student-Reported Positive School Experiences								
(1) Free	6.744	10	0.937	1.000	1.000	0.000		
(2) Fixed intercept mean	7.032	11	0.935	1.000	1.000	0.000	0.277	0.598
(3) Fixed intercept variance	8.815	12	0.915	1.000	1.000	0.000	2.150	0.143
(4) Fixed slope mean	**16.708**	**13**	**0.871**	**0.876**	**0.886**	**0.089**	**18.929**	**0.000**
(5) Fixed slope variance	8.914	13	0.909	1.000	1.000	0.000	0.050	0.823
(6) Fixed intercept-slope covariance	11.936	14	0.939	1.000	1.000	0.000	2.333	0.127
Teacher-Reported Hyperactivity-Inattention								
(1) Free	19.770*	10	1.008	0.933	0.919	0.157		
(2) Fixed intercept mean	**24.733***	**11**	**0.958**	**0.895**	**0.885**	**0.188**	**8.236**	**0.004**
(3) Fixed intercept variance	**28.651***	**11**	**1.018**	**0.864**	**0.852**	**0.213**	**8.303**	**0.004**
(4) Fixed slope mean	21.829*	11	0.983	0.917	0.909	0.167	2.088	0.149
(5) Fixed slope variance	**28.059***	**12**	**0.870**	**0.877**	**0.877**	**0.194**	**8.044**	**0.005**
(6) Fixed intercept-slope covariance	**33.916***	**12**	**0.818**	**0.832**	**0.832**	**0.227**	**6.323**	**0.012**
Teacher-Reported Behavioral Engagement								
(1) Free	10.134	10	0.918	0.999	0.998	0.019		
(2) Fixed intercept mean	**15.063**	**11**	**0.901**	**0.958**	**0.954**	**0.102**	**5.806**	**0.016**
(3) Fixed intercept variance	**28.801***	**11**	**0.752**	**0.814**	**0.797**	**0.214**	**13.580**	**0.000**
(4) Fixed slope mean	10.338	11	0.927	1.000	1.000	0.000	0.276	0.599
(5) Fixed slope variance	**13.265**	**12**	**0.899**	**0.987**	**0.987**	**0.054**	**3.975**	**0.046**
(6) Fixed intercept-slope covariance	**16.860**	**12**	**0.866**	**0.949**	**0.949**	**0.107**	**25.454**	**0.000**

*$p < 0.05$. Models displayed in bold were not retained, meaning that the parameter was freely estimated between groups in the following models. $\chi 2$, chi-square statistic; df, degrees of freedom; SCF, scaling correction factor; CFI, Comparative Fit Index; TLI, Tucker-Lewis Index; RMSEA, Root Mean Square Error of Approximation.

Looking first at the model with student-rated internalizing behaviors revealed that all parameters were equivalent between *La classe enchantée* and control groups, except for the means of the intercept and slope. As displayed in Figure 1, students in *La classe enchantée* had an initially (i.e., intercept) higher level of internalizing behaviors at pretest ($M = 1.687$, $p < 0.001$), which decreased (i.e., slope) over time ($M = -0.094$, $p = 0.034$), compared to the initially lower level found in students from the control group at pretest ($M = 1.498$, $p < 0.001$), which remained stable over time ($M = 0.000$, $p = 0.986$).

Second, the model with student-rated positive school experiences revealed that all parameters were equivalent between groups, except for the slope means. As displayed in Figure 1, students from both groups reported the same initial level at pretest ($M = 3.228$, $p < 0.000$), which remained stable in the *La classe enchantée* group ($M = -0.025$, $p = 0.641$), but decreased in the control group ($M = -0.192$, $p < 0.000$).

Third, looking at the model with teacher-reported hyperactivity-inattention indicates that all parameters differed between groups, except for the slope means, which showed a stable level of hyperactivity-inattention in the two groups ($M = -0.003$, $p = 0.867$). The initial level of hyperactivity-inattention at pretest was higher in *La classe enchantée* group ($M = 1.510$, $p < 0.000$) compared to the control group ($M = 1.300$, $p < 0.000$). There was also greater variability (i.e., intercept and slope variance) in the *La classe enchantée* group than in the control group (see Supplementary Table 1 for detailed parameters). Finally, we found a negative association between intercept and slope in the *La classe enchantée* group ($r = -0.099$, $p = 0.033$), but not in the control group ($r = -0.011$, $p = 0.387$). In other words, students in *La classe enchantée* who had an initially

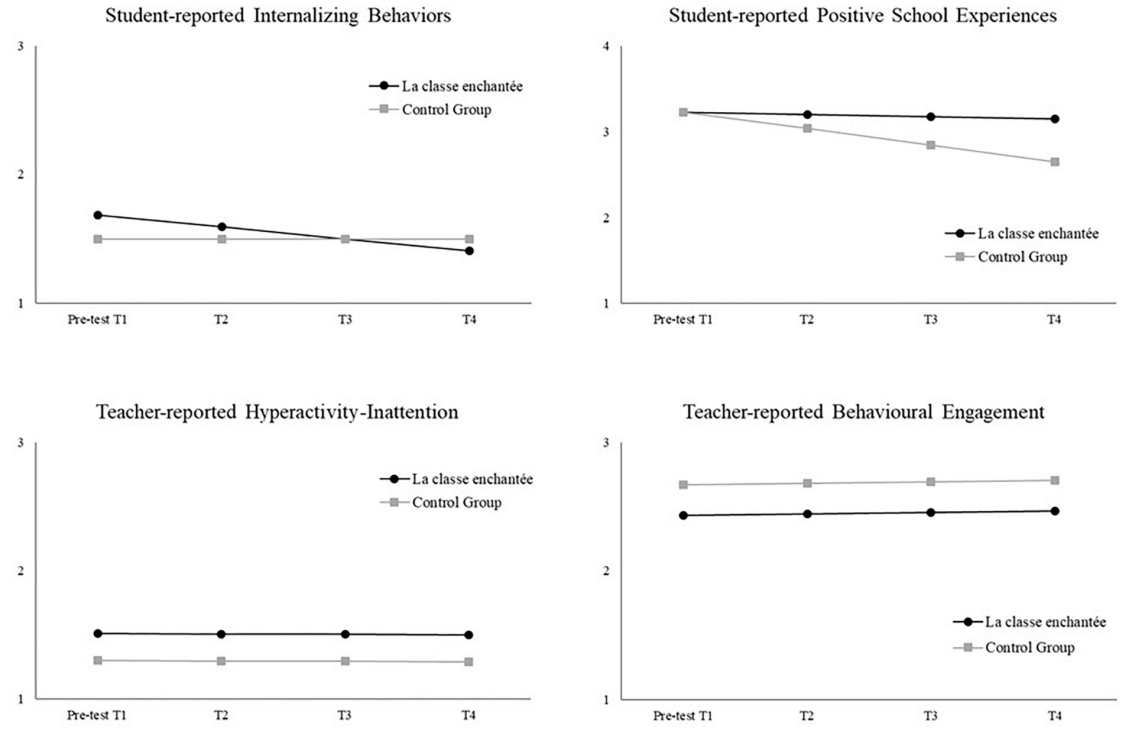

FIGURE 1
Latent curve model results per group.

higher level of hyperactivity-inattention tended to experience a greater decrease in these behaviors than those who had an initially lower level of such behaviors, whereas this association was not found in the control group. Results from this model should be interpreted with caution as the RMSEA indicated a poor level of fit, whereas the CFI and TLI suggested an acceptable level of fit.

Fourth, similarly to hyperactivity-inattention, the model with teacher-reported behavioral engagement indicates that all parameters differed between groups, except for the slope means, which showed a stable level of engagement in the two groups (M = 0.011, p = 0.532). The initial level of engagement at pretest was lower in the *La classe enchantée* group (M = 2.434, $p < 0.000$) compared to the control group (M = 2.668, $p < 0.000$). There was also greater variability (i.e., intercept and slope variance) in the *La classe enchantée* group than in the control group (see **Supplementary Table 1** for detailed parameters). Finally, we found a positive association between the intercept and slope in the control group (r = 0.016, p = 0.045), but not in the *La classe enchantée* group (r = −0.033, p = 0.097). This indicates that, among students from the control group, having an initially higher level of engagement was associated with a greater increase in engagement over time than for those who had an initially lower level of engagement. This association was not found in students in the *La classe enchantée* group.

Discussion

The goal of this study was to evaluate, using a quasi-experimental design, the impact on various dimensions of psychosocial adjustment of *La classe enchantée*, a high-quality music ECA program offered to first- and second-generation immigrant children over two school years (fourth and fifth grade). Program impacts were examined from the point of view of children for internalizing symptoms and positive experiences in school, which are typically best captured *via* self-reported measures, and from their homeroom teacher's perspective for externally visible behaviors, namely, hyperactivity-inattention and behavioral engagement in classroom work. The results were partially consistent with initial expectations of favorable program outcomes.

Initial similarities and differences between the intervention and control groups

The results first indicated that, contrary to trends reported both in the general ECA literature and in the more specialized literature focusing on music programs (Vandell et al., 2015;

Alegrado and Winsler, 2020), children who participated in *La classe enchantée* were not more advantaged than their peers who did not volunteer to participate in the program. Sociodemographic variables were similar across groups, including for individual (gender, age) and family background (family structure, immigration status) characteristics. However, the groups differed in some aspects of initial adjustment (i.e., internalizing problems, hyperactivity-inattention, and behavioral engagement according to preliminary bivariate associations and/or estimated growth curve intercepts), but always in a direction pointing to better adjustment in the control group as compared to the intervention group.

These results suggest that with an intentional approach specifically designed to foster inclusivity, it is possible to support ECA enrollment among children who usually participate less (McCabe et al., 2020). Despite its appeal from an equity point of view, it should be kept in mind that the initial differences in favor of the control group complicate the interpretation of the results (discussed next), showing comparatively favorable evolution in the intervention group compared to the control group for some outcomes, as apparent differences could reflect differential regression-to-the mean processes rather than real program effects.

Apparent program effects

Even though caution is warranted in the context of a quasi-experimental study with initial differences between intervention and control groups, the results are generally consistent with the premise that high-quality music ECA might support positive adjustment among first- and second-generation immigrant children, at least for the two self-reported outcomes considered. For these outcomes – that is, positive school experiences and internalizing problems – children involved in *La classe enchantée* evolved more positively over time compared to their non-involved classmates. More specifically, students who participated in *La classe enchantée* reported, over the two-year observation window, decreasing levels of internalizing behaviors, whereas these behaviors remained stable for the control group. For positive school experiences, consistent with studies showing a slight decline in these positive experiences over time, students in the control group reported such a decline from fourth to fifth grade; however, this decline was not observed in students who participated in *La classe enchantée*.

The results thus suggest that the program helped children from immigrant families feel less distress and more positive emotions and excitement toward school. Given that these children are more likely to encounter challenges due to their family's migration and resettlement trajectory (Motti-Stefanidi, 2019), the promotion of musical ECA appears an interesting, positive avenue to support their resilience. These results correspond to the positive youth development premises suggesting that high-quality ECAs in general support children's well-being and positive attitudes toward larger institutions, most notably their school (Lerner et al., 2015), and that music ECA in particular can foster emotional regulation (Van Goethem and Sloboda, 2011; Archambault K. et al., 2019). They are also consistent with the idea that these benefits appear gradually, as exposure to high-quality ECA builds up over time (Simpkins, 2015; Vandell et al., 2015). Features of *La classe enchantée* corresponding to characteristics considered core for high-quality programming might have supported these positive outcomes, like the fact that the program involved schoolmates and promoted positive relationships with peers in the program, which continued to be experienced at school. Beyond relationships with peers and adults directly involved in the program, participation in the program also provided occasions to "shine" at school-wide concerts in front of the whole student body, teachers, and parents, as well as in other community venues. Qualitative interviews with participants suggested that these occasions contributed to the building of a general sense of excitement or "zest," including toward school (Authors, submitted).

In contrast, results for teacher-reported outcomes showed no comparatively favorable trends on average over time in the intervention group as compared to the control group. In both groups, the average level of hyperactivity-inattention and behavioral engagement in classroom work remained stable over time, meaning that the initial discrepancy found between groups (in favor of the control group) lasted throughout the study. These results are consistent with Ciocanel et al.'s (2017) meta-analysis of positive youth development interventions, which found positive impacts for psychological adjustment (i.e., emotional distress, self-perceptions), but not for problem behavior. They are also consistent with the generally held consensus that hyperactivity and inattention problems (and associated difficulties in terms of behavioral engagement) result in substantial part from neurological functioning impairments, which are not likely to change through exposure to low-intensity ECA programs not specifically designed to impact such outcomes, as compared to targeted intensive interventions or medication (Thapar et al., 2013). It is also possible that gains made in an ECA taking place outside of regular school hours do not necessarily translate into the classroom context. Finally, measurement issues might also contribute to explain the different results for self-reported and teacher-reported outcomes. Participants in *La classe enchantée* might have consciously or unconsciously provided inflated scores, knowing that the research project's goal was to evaluate the program. However, the fact that differences between groups

tented to emerge slowly over time suggests against this interpretation.

Even though children in *La classe enchantée* did not improve on average in terms of teacher-rated hyperactivity-inattention, results showed that among this group only, the initial level of hyperactivity-inattention (i.e., intercept) was associated with evolution over time (i.e., slope), suggesting that the program might have yielded benefits among those who had initially higher hyperactivity-inattention levels. This result is consistent with other findings suggesting that participation in ECA might be especially beneficial for youth presenting an at-risk or less favorable initial profile (Simpkins, 2015; Vandell et al., 2015; Deutsch et al., 2017). However, given the small sample size, firm conclusions will require replication.

Limitations and future directions

The results should be interpreted with caution. As already stated, this study is based on a non-equivalent quasi-experimental group design, meaning that the results might overestimate or underestimate the real impacts of the program. The small sample size also yields low power to detect program impacts and to conduct subgroup analyses (e.g., by gender). In addition, the control group did not receive any alternative form of ECA; thus, the findings could reflect non-specific effects that other form of ECA programming might have achieved. The cognitive outcomes that have been the main focus of past research evaluating music education programs, such as memory, IQ, and executive functioning, were not part of this evaluation, which limits our capacity to compare the findings to those of previous studies. Finally, the high quality of the ECA experiences offered in *La classe enchantée* spanning 2 years is probably not representative of typical community-based offerings, thus limiting potential generalization. These limitations underscore the oft-repeated need for large randomized control trials to better understand ECA impacts and processes, and how they might depend on the characteristics of both participants and activities (Vandell et al., 2015; Roth and Brooks-Gunn, 2016).

Conclusion

This study adds to an emerging experimental and quasi-experimental research base emphasizing the potential of music ECA for supporting positive psychosocial outcomes among children and youth from diverse ethnic, migratory, and socioeconomic backgrounds (Holochwost et al., 2017, 2021). The findings suggest that targeted efforts specifically dedicated to that end can successfully encourage long-term ECA participation in diverse populations of children, including among subgroups with socioeconomic and behavioral profiles traditionally associated with non-participation. They also show that among first- and second-generation immigrants attending public low-income schools, sustained participation in quality music ECA has the potential to support some dimension of psychosocial adjustment. Although limited in several ways, these encouraging findings should provide support for the provision of high-quality ECA to improve access among underserved population, as well as the launch of larger, better control studies in the future.

Data availability statement

The datasets presented in this article are not readily available because of ethical reasons related to confidentiality issues. Requests to access the datasets should be directed to VD, veronique.dupere@umontreal.ca.

Ethics statement

The studies involving human participants were reviewed and approved by the Université de Montréal's IRB (approval number: #CERAS-2017-18-073-D). Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin.

Author contributions

EO performed the statistical analysis and drafted sections of the manuscript. VD conceived the study, participated in its design and coordination, and drafted sections of the manuscript. IA participated in the design of the study and interpretation of the data, and helped to draft the manuscript. MM and ÉT coordinated the study, performed the measurements, and revised the manuscript. A-SD participated in the design of the study, the literature review, and the interpretation of the data and helped to draft the manuscript. All authors read and approved the final manuscript.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/feduc.2022.937983/full#supplementary-material

References

Achenbach, T. M., Ivanova, M. Y., Rescorla, L. A., Turner, L. V., and Althoff, R. R. (2016). Internalizing/externalizing problems: review and recommendations for clinical and research applications. *J. Am. Acad. Child Adolesc. Psychiatry* 55, 647–656. doi: 10.1016/j.jaac.2016.05.012

Alegrado, A., and Winsler, A. (2020). Predictors of taking elective music courses in middle school among low-SES, ethnically diverse students in Miami. *J. Res. Music Educ.* 68, 5–30. doi: 10.1177/0022429420908282

Archambault, I., Janosz, M., Goulet, M., Dupéré, V., and Gilbert-Blanchard, O. (2019). "Promoting student engagement from childhood to adolescence as a way to improve positive youth development and school completion," in *Handbook of Student Engagement Interventions: Working with Disengaged Students*, eds J. A. Fredricks, A. L. Reschly, and S. L. Christenson (London: Elsevier), 13–29.

Archambault, K., Vaugon, K., Deumié, V., Brault, M., Perez, R. M., Peyrin, J., et al. (2019). MAP: a personalized receptive music therapy intervention to improve the affective well-being of youths hospitalized in a mental health unit. *J. Music Ther.* 56, 381–402. doi: 10.1093/jmt/thz013

Beauchaine, T. P., Webster-Stratton, C., and Reid, M. J. (2005). Mediators, moderators, and predictors of 1-year outcomes among children treated for early-onset conduct problems: a latent growth curve analysis. *J. Consult. Clin. Psychol.* 73, 371–388. doi: 10.1037/0022-006X.73.3.371

Browne, M. W., and Cudeck, R. (1992). Alternative ways of assessing model fit. *Soc. Methods Res.* 21, 230–258. doi: 10.1177/0049124192021002005

Camacho, D. E., and Fuligni, A. J. (2015). Extracurricular participation among adolescents from immigrant families. *J. Youth Adolesc.* 44, 1251–1262. doi: 10.1007/s10964-014-0105-z

Campbell, S. B., Halperin, J. M., and Sonuga-Barke, E. J. S. (2014). "A developmental perspective on attention-deficit/hyperactivity disorder (ADHD)," in *Handbook of Developmental Psychopathology*, eds M. Lewis and K. D. Rudolph (Boston, MA: Springer), 427–448.

Capron, C., Thérond, C., and Duyme, M. (2007). Psychometric properties of the French version of the self-report and teacher strengths and difficulties questionnaire (SDQ). *Eur. J. Psychol. Assess.* 23, 79–88. doi: 10.1027/1015-5759.23.2.79

Caspi, A., Houts, R. M., Belsky, D. W., Goldman-Mellor, S. J., Harrington, H., Israel, S., et al. (2014). The p factor: one general psychopathology factor in the structure of psychiatric disorders? *Clin. Psychol. Sci.* 2, 119–137. doi: 10.1177/2167702613497473

Christensen, K. M. (2022). *A Systematic Review and Meta-Analysis of the Effects of After-School Programs on Academic, Social, Behavioral, Mental Health, and Identity Outcomes Among Youth with Marginalized Identities*. Doctoral Dissertation, Boston. Available online at: https://scholarworks.umb.edu/doctoral_dissertations/676

Ciocanel, O., Power, K., Eriksen, A., and Gillings, K. (2017). Effectiveness of positive youth development interventions: a meta-analysis of randomized controlled trials. *J. Youth Adolesc.* 46, 483–504. doi: 10.1007/s10964-016-0555-6

Cooper, P. K. (2020). It's all in your head: A meta-analysis on the effects of music training on cognitive measures in schoolchildren. *Int. J. Music Educ.* 38, 321–336. doi: 10.1177/0255761419881495

De Los Reyes, A., Augenstein, T. M., Wang, M., Thomas, S. A., Drabick, D. A. G., Burgers, D. E., et al. (2015). The validity of the multi-informant approach to assessing child and adolescent mental health. *Psychol. Bull.* 141, 858–900. doi: 10.1037/a0038498

Degé, F., Wehrum, S., Stark, R., and Schwarzer, G. (2014). Music lessons and academic self-concept in 12- to 14-year-old children. *Music. Sci.* 18, 203–215. doi: 10.1177/1029864914523283

Deutsch, N. L., Blyth, D. A., Kelley, J., Tolan, P. H., and Lerner, R. M. (2017). "Let's talk after-school: the promises and challenges of positive youth development for after-school research, policy, and practice," in *After-School Programs to Promote Positive Youth Development*, ed. N. L. Deutsch (Berlin: Springer), 45–68.

Dumont, E., Syurina, E. V., Feron, F. J. M., and van Hooren, S. (2017). Music interventions and child development: a critical review and further directions. *Front. Psychol.* 8:1694. doi: 10.3389/fpsyg.2017.01694

Eccles, J., and Gootman, J. A. (2002). *Community Programs to Promote Youth Development*. Washington, DC: National Academies Press.

Eccles, J. S., and Templeton, J. (2002). Extracurricular and other after-school activities for youth. *Rev. Res. Educ.* 26, 113–180. doi: 10.3102/0091732X026001113

Eddy, L. D., Anastopoulos, A. D., Dvorsky, M. R., Silvia, P. J., Labban, J. D., and Langberg, J. M. (2021). An RCT of a CBT intervention for emerging adults with ADHD attending college: functional outcomes. *J. Clin. Child Adolesc. Psychol.* 50, 844–857. doi: 10.1080/15374416.2020.1867989

Enders, C. K. (2010). *Applied Missing Data Analysis*. New York, NY: Guildford.

Fredricks, J. A., Naftzger, N., Smith, C., and Riley, A. (2017). "Measuring youth participation, program quality, and social and emotional skills in after-school programs," in *After-School Programs to Promote Positive Youth Development*, ed. N. L. Deutsch (Cham: Springer), 23–43.

Frischen, U., Schwarzer, G., and Degé, F. (2021). Music lessons enhance executive functions in 6-to 7-year-old children. *Learn. Instruct.* 74:101442. doi: 10.1016/j.learninstruc.2021.101442

Furlong, M. J., You, S., Renshaw, T. L., O'Malley, M. D., and Rebelez, J. (2013). Preliminary development of the positive experiences at school scale for elementary school children. *Child Ind. Res.* 6, 753–775. doi: 10.1007/s12187-013-9193-7

Garber, J., and Rao, U. (2014). "Depression in children and adolescents," in *Handbook of Developmental Psychopathology*, 3rd Edn, eds M. Lewis and K. D. Rudolph (Boston, MA: Springer), 489–520.

Goodman, R. (2001). Psychometric properties of the strengths and difficulties questionnaire. *J. Am. Acad. Child Adolesc. Psychiatry* 40, 1337–1345. doi: 10.1097/00004583-200111000-00015

Hallam, S. (2015). *The Power of Music: A Research Synthesis of the Impact of Actively Making Music on the Intellectual, Social and Personal Development of Children and Young People*. London: International Music Education Research Centre (iMerc).

Heath, R. D., Anderson, C., Turner, A. C., and Payne, C. M. (2018). Extracurricular activities and disadvantaged youth: a complicated—but promising—story. *Urban Educ.* 1–35. doi: 10.1177/0042085918805797

Hirsch, B. J., Deutsch, N. L., and DuBois, D. L. (2011). *After-School Centers and Youth Development: Case Studies of Success and Failure*. New York, NY: Cambridge University Press.

Hoge, R. D., Meginbir, L., Khan, Y., and Weatherall, D. (1985). A multitrait-multimethod analysis of the preschool behavior questionnaire. *J. Abnorm. Child Psychol.* 13, 119–127. doi: 10.1007/BF00918376

Holochwost, S. J., Bose, J. H., Stuk, E., Brown, E. D., Anderson, K. E., and Wolf, D. P. (2021). Planting the seeds: orchestral music education as a context for fostering growth mindsets. *Front. Psychol.* 11:586749. doi: 10.3389/fpsyg.2020.586749

Holochwost, S. J., Propper, C. B., Wolf, D. P., Willoughby, M. T., Fisher, K. R., Kolacz, J., et al. (2017). Music education, academic achievement, and executive functions. *Psychol. Aesthe. Creat. Arts* 11, 147–166. doi: 10.1037/aca0000112

Hu, L. T., and Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. *Struct. Equat. Model.* 6, 1–55. doi: 10.1080/10705519909540118

Kirschner, S., and Tomasello, M. (2010). Joint music making promotes prosocial behavior in 4-year-old children. *Evol. Hum. Behav.* 31, 354–364. doi: 10.1016/j.evolhumbehav.2010.04.004

Knaus, M. C. (2021). A double machine learning approach to estimate the effects of musical practice on student's skills. *J. Royal Stat. Soc. Ser. A* 184, 282–300. doi: 10.1111/rssa.12623

Larson, R. W., Walker, K. C., Rusk, N., and Diaz, L. B. (2015). Understanding youth development from the practitioner's point of view: a call for research on effective practice. *Appl. Dev. Sci.* 19, 74–86. doi: 10.1080/10888691.2014.972558

Lauer, P. A., Akiba, M., Wilkerson, S. B., Apthorp, H. S., Snow, D., and Martin-Glenn, M. L. (2006). Out-of-school-time programs: a meta-analysis of effects for at-risk students. *Rev. Educ. Res.* 76, 275–313. doi: 10.3102/00346543076002275

Lerner, R. M., Lerner, J. V., Bowers, E. P., and Geldhof, G. J. (2015). "Positive youth development and relational developmental systems," in *Handbook of Child Psychology and Developmental Science*, 7th Edn, eds W. F. Overton and P. C. Molenaar (Hoboken, NJ: Wiley), 607–651.

Lerner, R. M., Wang, J., Hershberg, R. M., Buckingham, M. H., Harris, E. M., Tirrell, J. M., et al. (2017). "Positive youth development among minority youth: a relational developmental systems model," in *Handbook on Positive Development of Minority Children and Youth*, eds N. J. Cabrera and B. Leyendecker (Cham: Springer International Publishing), 5–17.

Liddle, H. A., Rowe, C. L., Dakof, G. A., Henderson, C. E., and Greenbaum, P. E. (2009). Multidimensional family therapy for young adolescent substance abuse: twelve-month outcomes of a randomized controlled trial. *J. Consult. Clin. Psychol.* 77, 12–25. doi: 10.1037/a0014160

Marsh, H. W., Hau, K. T., and Grayson, D. (2005). "Goodness of fit in structural equation models," in *Contemporary Psychometrics*, eds A. Maydeu-Olivares and J. J. McArdle (Mahwah, NJ: Erlbaum), 275–340.

Marsh, K. (2012). "Music in the lives of refugee and newly arrived immigrant children in Sydney, Australia," in *Oxford Handbook of Children's Musical Cultures*, eds P. Campbell and T. Wiggins (Oxford: Oxford University Press), 492–509.

Marsh, K. (2017). Creating bridges: music, play and well-being in the lives of refugee and immigrant children and young people. *Music Educ. Res.* 19, 60–73. doi: 10.1080/14613808.2016.1189525

McCabe, J., Dupéré, V., Dion, E., Thouin, É, Archambault, I., Dufour, S., et al. (2020). Why do extracurricular activities prevent dropout more effectively in some high schools than in others? A mixed-method examination of organizational dynamics. *Appl. Dev. Sci.* 24, 323–338. doi: 10.1080/10888691.2018.1484746

Meier, A., Hartmann, B. S., and Larson, R. (2018). A quarter century of participation in school-based extracurricular activities: inequalities by race, class, gender and age? *J. Youth Adolesc.* 47, 1299–1316. doi: 10.1007/s10964-018-0838-1

Milette, M.-C. (2021). *Évaluation de la mise en œuvre du programme d'activités parascolaires musicales La classe enchantée.* Master's thesis. Montreal, QC: Université de Montréal.

Ministry of Education (2017). *Deprivation Indices for Public Schools in Quebec*. Quebec, QC: Quebec Government.

Motti-Stefanidi, F. (2019). Resilience among immigrant youths: who adapts well, and why? *Curr. Direct. Psychol. Sci.* 28, 510–517. doi: 10.1177/0963721419861412

Muthén, L. K., and Muthén, B. O. (2017). *Mplus User's Guide*, 8th Edn. Los Angeles, CA: Muthén & Muthén.

Olivier, E., Morin, A. J. S., Langlois, J., Tardif-Grenier, K., and Archambault, I. (2020). Internalizing and externalizing behavior problems and student engagement in elementary and secondary school students. *J. Youth Adolesc.* 49, 2327–2346. doi: 10.1007/s10964-020-01295-x

Pagani, L. S., Fitzpatrick, C., Archambault, I., and Janosz, M. (2010). School readiness and later achievement: a French Canadian replication and extension. *Dev. Psychol.* 46, 984–994. doi: 10.1037/a0018881

Park, H., Lin, C.-H., Liu, C., and Tabb, K. M. (2015). The relationships between after-school programs, academic outcomes, and behavioral developmental outcomes of Latino children from immigrant families: findings from the 2005 National household education surveys program. *Child. Youth Serv. Rev.* 53, 77–83. doi: 10.1016/j.childyouth.2015.03.019

Pelham, W. E., Waschbusch, D. A., Hoza, B., Gnagy, E. M., Greiner, A. R., Sams, S. E., et al. (2011). Music and video as distractors for boys with ADHD in the classroom: comparison with controls, individual differences, and medication effects. *J. Abnorm. Child Psychol.* 39, 1085–1098. doi: 10.1007/s10802-011-9529-z

Reisner, E. R., White, R. N., Russell, C., and Birmingham, J. (2004). *Building Quality, Scale, and Effectiveness in After-School Programs. Report prepared for the After-School Corporation*. Washington, D.C: Policy Studies Associates.

Rickard, N. S., Appelman, P., James, R., Murphy, F., Gill, A., and Bambrick, C. (2013). Orchestrating life skills: the effect of increased school-based music classes on children's social competence and self-esteem. *Int. J. Music Educ.* 31, 292–309. doi: 10.1177/0255761411434824

Rickard, N. S., Bambrick, C. J., and Gill, A. (2012). Absence of widespread psychosocial and cognitive effects of school-based music instruction in 10–13-year-old students. *Int. J. Music Educ.* 30, 57–78. doi: 10.1177/0255761411431399

Ritblatt, S., Longstreth, S., Hokoda, A., Cannon, B.-N., and Weston, J. (2013). Can music enhance school-readiness socioemotional skills? *J. Res. Child. Educ.* 27, 257–266. doi: 10.1080/02568543.2013.796333

Roth, J. L., and Brooks-Gunn, J. (2016). Evaluating youth development programs: progress and promise. *Appl. Dev. Sci.* 20, 188–202. doi: 10.1080/10888691.2015.1113879

Roth, J. L., Malone, L. M., and Brooks-Gunn, J. (2010). Does the amount of participation in afterschool programs relate to developmental outcomes? A review of the literature. *Am. J. Commu. Psychol.* 45, 310–324. doi: 10.1007/s10464-010-9303-3

Sala, G., and Gobet, F. (2017). When the music's over. Does music skill transfer to children's and young adolescents' cognitive and academic skills? A meta-analysis. *Educ. Res. Rev.* 20, 55–67. doi: 10.1016/j.edurev.2016.11.005

Satorra, A., and Bentler, P. M. (2010). Ensuring positiveness of the scaled difference chi-square test statistic. *Psychometrika* 75, 243–248. doi: 10.1007/s11336-009-9135-y

Schellenberg, E. G., Corrigall, K. A., Dys, S. P., and Malti, T. (2015). Group music training and children's prosocial skills. *PLoS One* 10:e0141449. doi: 10.1371/journal.pone.0141449

Schellenberg, E. G., and Mankarious, M. (2012). Music training and emotion comprehension in childhood. *Emotion* 12, 887–891. doi: 10.1037/a0027971

Schumacker, R. E., and Lomax, R. G. (1996). *A Beginner's Guide to Structural Equation Modeling*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Simpkins, S. D. (2015). When and how does participating in an organized after-school activity matter? *Appl. Dev. Sci.* 19, 121–126. doi: 10.1080/10888691.2015.1056344

Simpkins, S. D., Delgado, M. Y., Price, C. D., Quach, A., and Starbuck, E. (2013). Socioeconomic status, ethnicity, culture, and immigration: examining the potential mechanisms underlying Mexican-origin adolescents' organized activity participation. *Dev. Psychol.* 49, 706–721. doi: 10.1037/a0028399

Smith, C., Peck, S. C., Denault, A.-S., Blazevski, J., and Akiva, T. (2010). Quality at the point of service: profiles of practice in after-school settings. *Am. J. Commun. Psychol.* 45, 358–369. doi: 10.1007/s10464-010-9315-z

Smith, E. P., Witherspoon, D. P., and Wayne Osgood, D. (2017). Positive youth development among diverse racial–ethnic children: quality afterschool contexts as developmental assets. *Child Dev.* 88, 1063–1078. doi: 10.1111/cdev.12870

Swaminathan, S., and Schellenberg, E. G. (2021). "Music training," in *Cognitive Training: An Overview of Features and Applications*, eds T. Strobach and J. Karbach (Cham: Springer International Publishing), 307–318.

Thapar, A., Cooper, M., Eyre, O., and Langley, K. (2013). Practitioner review: what have we learnt about the causes of ADHD? *J. Child Psychol. Psychiatry* 54, 3–16. doi: 10.1111/j.1469-7610.2012.02611.x

Tremblay, R. E., Desmarais-Gervais, L., Gagnon, C., and Charlebois, P. (1987). The preschool behavior questionnaire: stability of its factor structure between cultures, sexes, ages and socioecconomic classes. *Int. J. Behav. Dev.* 10, 467–484. doi: 10.1177/016502548701000406

Van Goethem, A., and Sloboda, J. (2011). The functions of music for affect regulation. *Music. Sci.* 15, 208–228. doi: 10.1177/1029864911401174

Vandell, D. L., Larson, R. W., Mahoney, J. L., and Watts, T. W. (2015). "Children's organized activities," in *Handbook of Child Psychology and Developmental Science*, ed. R. M. Lerner (Hoboken, NJ: Wiley), 305–344.

Vasey, M., Bosmans, G., and Ollendick, T. (2014). "The developmental psychopathology of anxiety," in *Handbook of Developmental Psychopathology*, 3rd Edn, eds M. Lewis and K. Rudolph (Berlin: Springer), 543–560.

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Family functioning and adolescent depression: A moderated mediation model of self-esteem and peer relationships

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In consideration of family system theory, the vulnerability model of depression, and the stress buffering model of social support, the current study examined the effect of family functioning on adolescent depression, the mediating effect of self-esteem, and the moderating effect of peer relationships. A sample of Chinese adolescents (n=562, 47.15% male, 52.85% female, mean age 14.33years, SD=1.81years) completed questionnaires regarding family functioning, depression, self-esteem, and peer relationships. The results showed that: (1) family functioning had a significant negative predictive effect on adolescent depression; (2) self-esteem plays a mediating role between family functioning and adolescent depression; and (3) peer relationships have a moderating effect on the relationship between self-esteem and adolescent depression, supporting the moderated mediation model. These results reveal the influence mechanism of family functioning on adolescent depression and have implications for adolescent depression intervention.

KEYWORDS

adolescent, family functioning, self-esteem, peer relationships, depression

Introduction

Depression is a common mental disorder characterized by sadness, inability to experience happiness, self-criticism, and physical symptoms such as poor concentration, fatigue, loss of energy, and disturbed sleep or appetite (World Health Organization, 2017). Depression can seriously affect adolescents' physical and mental development (Li and Li, 2022), leading to truancy and school avoidance, delinquency, and confrontation, and can increase their risk of substance abuse and, in severe cases, even suicide (Egger et al., 2003; Rowe et al., 2006; Johnson et al., 2018). A recent meta-analysis showed that the overall detection rate of depressive symptoms among Chinese adolescents was 28.4% (Liu et al., 2020), which indicates that more attention must be paid to the issues of depression among Chinese adolescents.

Previous studies have found that poor family functioning can make individuals depressed (Cheng et al., 2022), and family functioning plays an important role in the development, process, and relapse of depression (Keitner et al., 1995; Sireli and Soykan, 2016). However, few studies have explored the mediating and moderating mechanisms of family functioning on depression. According to the ecological systems theory, family, peer, and individual psychological characteristics (e.g., self-esteem, etc.) have a strong impact on an individual's mental health (Bronfenbrenner, 1989). The roles of self-esteem and peer relationships in the influence of family functioning on adolescent depression deserve attention. Therefore, the current study aimed to determine the association between family functioning and adolescent depression (a psychological disease and negative emotion) and to explore the mediating role of self-esteem and the moderating role of peer relationships in Chinese adolescents.

Family functioning and adolescent depression

Family functioning is the function of the family system itself, which refers to the ability of the family to function effectively to meet basic needs and manage conflicts (Jona et al., 2017). The circumplex model of marital and family systems considers family as functioning in three dimensions: family cohesion, flexibility (initially called adaptability), and communication (Olson, 2000). Family cohesion is the ability to maintain strong emotional bonds among family members. Flexibility focuses on how the family system balances stability and change. Good communication promotes family cohesion and flexibility (Olson et al., 2019).

Numerous theoretical and empirical studies have linked family dysfunction to depression. The effect of family functioning on adolescent depression can be explained using the family system theory. According to family system theory, the better the overall function of the family system, the better the psychological state and behavioral performance of its members, leading to less depression or other emotional and behavioral problems (Beavers and Hampson, 2000). Family cohesion can provide a warm family environment and positive emotional support, thus reducing the likelihood of adolescents developing depression or other forms of adverse emotional distress. Family flexibility, on the other hand, enables families to cope with change and reduces the impact of negative events on adolescents' mental health (Nam et al., 2016). Positive communication leads to less family conflict, enhancing family adaptability and cohesion and thus playing a protective role in adolescent mental health (Yee and Sulaiman, 2017). Empirical studies have found that family functioning has a significant influence on adolescent depression (Lin et al., 2008; Sireli and Soykan, 2016; Shao et al., 2020), that family cohesion is significantly negatively correlated with depression (Kashani et al., 1995; Roley et al., 2014; Zahra and Saleem, 2020), and that low family adaptability and poor family communication play important roles in adolescent depression (Gladstone et al., 2005; Sheeber et al., 2007; Lee et al., 2017). A recent meta-analysis showed that family dysfunction is closely related to depressive symptoms, and that family functioning is an important predictor of individual depression (Guerrero-Muñoz et al., 2021). Based on the above-mentioned literature, then, we proposed our first hypothesis as follows:

> *Hypothesis 1*: There is a significantly negative correlation between family functioning and adolescent depression.

The mediating role of self-esteem

Adolescent depression is not only affected by family functioning, but also related to individual characteristics. Self-esteem, as an individual characteristic, has been shown to have a particularly important influence on depression. Self-esteem is a set of thoughts and feelings regarding one's own worth and importance (Rosenberg, 1965). The vulnerability model of depression suggests that low self-esteem is a predisposition factor for depression, and that low self-esteem leads to depression through both interpersonal (e.g., seeking excessive reassurance, seeking negative feedback, social avoidance) and intrapersonal pathways (e.g., ruminating about negative aspects of the self; Orth et al., 2008). A large number of studies have confirmed the relationship between self-esteem and depression, also noting that implicit self-esteem predicts future depressive symptoms (Franck et al., 2007), that low self-esteem predicts adult depression (Steiger et al., 2014), and that low self-esteem not only directly predicts depression, but also has an impact on depression through psychological inflexibility (Peng et al., 2021b).

The formation and development of adolescent self-esteem has been shown to be the result of the interactions between social, family, and school cultures, of which family is regarded as the most important setting for the building up of self-esteem (Bradshaw, 1996). According to the circumplex model of marital and family systems, family cohesion can foster self-esteem by promoting family members' emotions and creating a warm family atmosphere, while flexibility can provide a good environment for the development of self-esteem by maintaining family stability and balance (Olson et al., 2019). Studies have shown that emotional communication, positive communication, problem solving and family rules are significantly positively correlated with self-esteem (Liu and Zhao, 2018), while family cohesion and adaptability are significantly positively correlated with self-esteem (Kawash and Kozeluk, 1990; Merkaš and Brajša-Žganec, 2011; Mao et al., 2015). Poor family functioning reduces adolescents' self-esteem (Yen et al., 2013) and increases depressive symptoms (Guerrero-Muñoz et al., 2021). Good family functioning can promote adolescent self-esteem (Shi et al., 2017), reducing depressive symptoms (Lorenzo-Blanco et al., 2016). Self-esteem plays a mediating role in family functioning and mental health (Man et al., 2017; KavehFarsani et al., 2020). Based on these aforementioned findings, then, we proposed our second hypothesis as follows:

Hypothesis 2: Self-esteem plays a mediating role between family functioning and adolescent depression.

The moderating role of the peer relationship

It is well-known that low self-esteem predicts adolescent depression (Orth et al., 2008), but not all adolescents with low self-esteem exhibit the same levels of depression. One possible reason for this phenomenon is differences in adolescents' peer relationships. In terms of the psychological definition of stress, low self-esteem is closely related to high stress assessment (Cohen and Wills, 1985). According to the stress buffering model of social support, positive peer relationships, as an important social support force, can effectively relieve pressure experienced by adolescents due to low self-esteem and thereby play a positive role in promoting adolescent mental health (Sarason et al., 1990; Rueger et al., 2016). In other words, peer relationships may act as moderators to mitigate the negative effects of low self-esteem.

A peer relationship is a kind of parallel and equal interpersonal relationship established and developed through the process of communication between peers or individuals at the same level of psychological development (Zhou et al., 2015). With the rapid development of adolescent physiology and psychology, adolescent peer relationships play an increasingly important role in the adolescent social support system. Studies have shown that positive peer relationships can provide adolescents with information, as well as emotional and value support (Xu and Zhang, 2011), all of which can enhance positive behavioral traits (Schwartz et al., 2010) and protect adolescents from experiencing victimization and depression (Abou-ezzeddine et al., 2007; Healy and Sanders, 2018). This can effectively moderate the relationship between adolescent life stresses and depression as well as against other negative affects (Rubin et al., 1992; Deng et al., 2021). This can also moderate the relationship between adolescent empathy and depression (Yan and Li, 2021) and the relationship between adolescent self-esteem and pathological Internet use (Zhang et al., 2013). At the same time, high quality peer relationships can also affect core self-evaluation (Dong et al., 2022), promote the formation of one's positive self-concept thus forming a more mature level of cognition, enhancing emotional regulation ability (Wang, 2006), reducing social withdrawal behavior, and abating the association between negative self-cognition and adolescent depression (Tang et al., 2018; Dong et al., 2022). Therefore, high quality peer relationships may alleviate the impact of low self-esteem on adolescent depression, while low quality peer relationships may increase the impact of low self-esteem on adolescent depression. Furthermore, peer relationships may play a moderating role in the relationship between adolescent self-esteem and depression. Based on these understandings, then, we proposed the third hypothesis as follows:

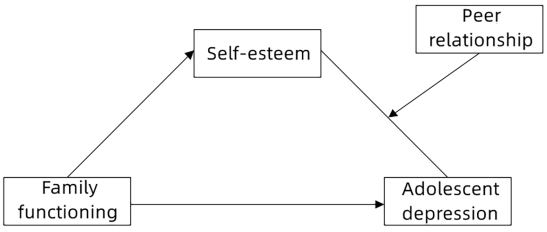

FIGURE 1
The proposed moderated mediation model.

Hypothesis 3: Peer relationships play a moderating role between self-esteem and adolescent depression.

The current study

Combining ecological systems theory, family system theory, and social support theory, the present study aimed to explore the complex moderated mediation model underlying the association between family functioning and adolescent depression (Figure 1). The purposes of our study were to test (a) whether family functioning could significantly predict adolescent depression; (b) whether self-esteem would mediate the association between family functioning and adolescent depression; and (c) whether peer relationships could moderate the association between self-esteem and adolescent depression.

Materials and methods

Participants

The participants in this study were recruited from two middle schools in Hunan and Guizhou provinces, China. A total of 700 questionnaires were sent out, and 562 valid questionnaires were collected after excluding invalid ones such as regular answers and missed answers. Participants were aged 12–19 years old ($M = 14.33$, $SD = 1.81$), 265 (47.15%) were boys and 297 (52.85%) were girls. In terms of their studies, 139 (24.73%) were in 7th grade, 138 (24.56%) were in 8th grade, 107 (19.04%) were in 9th grade, 66 (11.74%) were in 10th grade, 64 (11.39%) were in 11th grade, and 48 (8.54%) were in 12th grade.

Procedure

The study was approved by the Ethical Review Committee of Guizhou Medical University, as well as by the investigated schools and local education departments. Before data

collection, participants were informed of the purpose, confidentiality, and anonymity of this study, and informed consent was obtained. Participants completed the self-report questionnaires in class under the guidance of trained researchers.

Measurements

Family APGAR index

The Family APGAR Index (APGAR) was compiled by Smilkstein (1978) to measure family functioning. It has five items which represent adaptability, partnership, growth, affection, and resolve. Each item of the APGAR is rated using a three-point Likert scale that ranges from 0 (hardly ever) to 2 (almost always). The Chinese version of the APGAR has good reliability and validity among Chinese teenagers (Yen et al., 2013; Wang et al., 2019). In this study, the Cronbach α coefficient of the APGAR was 0.92. A score of 0–3 is classified as severe family dysfunction, 4–6 as moderate family dysfunction, and 7–10 as good family dysfunction (i.e., a low level of family dysfunction).

The Rosenberg self-esteem scale

The Rosenberg Self-Esteem Scale (RSES) was developed by Rosenberg (1965) to measure self-esteem. It is structured as a single dimension and contains ten items. Each item of the RSES is rated using a four-point Likert scale that ranges from 1 (very nonconforming) to 4 (very conforming). The revised Chinese version of the Rosenberg Self-esteem Scale (RSES-R) has been shown to have good reliability and validity in Chinese adolescents (Wei et al., 2018). In this study, the Cronbach α coefficient of the RSES-R was 0.89.

Youth self-rating index

The youth self-rating index (YSR) was developed by Achenbach (1991). The current study used only the depression subscale of the YSR, which comprises 16 items which are rated using a three-point Likert scale ranging from 1 (disagree) to 3 (Quite agree with). The Chinese version of the YSR has good reliability and validity in Chinese adolescents (Liu et al., 1997). In this study, the Cronbach α coefficient of the YSR depression subscale was 0.94.

The peer relationship scale

The peer relationship scale was compiled by Asher et al. (1984) and revised by Zhang (2008) to be translated into Chinese. It measures three dimensions—welcome, exclusion, and loneliness—using a total of 16 items. Each is scored by up to 4 points, and 10 of the items are scored in reverse. After the reverse scoring conversion, the total score of the scale is calculated. The higher the total score, the better the peer relationship. The Cronbach α coefficient of the scale in this study was 0.93.

Data analysis strategy

Statistical analyses were performed using SPSS 24.0 and Hayes' (2013) PROCESS macro. First, descriptive statistics and correlation analysis were performed on the data using SPSS 24.0. Next, we used Hayes' (2013) PROCESS macro (Model 4) to examine the mediating effect of self-esteem on the relationship between family functioning and adolescent depression. We then used Hayes' (2013) PROCESS macro (Model 14) to examine whether the peer relationship moderated this mediation process. Finally, the simple slope test was used to explain the moderation effect. All variables were standardized before mediating and moderating effects were examined.

Results

Preliminary analysis

Harman's single-factor test was used to test the effect of common method bias. Exploratory factor analysis was conducted on the four variables together. The results showed that there were six factors with characteristic roots greater than 1, and the explanation rate of the first factor was 35.41%—less than 40%—indicating that there was no common method bias in this study. Common method bias was further tested by confirmatory factor analysis (CFA). The results showed that the single-factor CFA model did not meet the standard of good fitting ($\chi^2/df = 6.98$, CFI = 0.65, TLI = 0.63, RMSEA = 0.103). Therefore common method bias is not serious (Iverson and Maguire, 2000).

The mean, standard deviation, and Pearson correlation of all variables are shown in Table 1. The teacher–student relationship was negatively associated with deviant peer affiliation and bullying perpetration. Deviant peer affiliation and peer pressure were positively associated with bullying perpetration. Additionally, peer pressure was positively associated with deviant peer affiliation.

TABLE 1 Descriptive statistics and correlations for all variables.

	Family functioning	Peer relationship	Self-esteem	Depression
Family functioning	1			
Peer relationship	0.49**	1		
Self-esteem	0.54**	0.70**	1	
Depression	−0.46**	−0.64**	−0.67**	1
M	6.08	49.87	28.43	24.59
SD	2.53	9.61	5.27	6.64

**$P < 0.01$.

Testing for mediation effect

Hypothesis 2 proposed that self-esteem plays a mediating role between family functioning and adolescent depression. To verify this hypothesis, the PROCESS macro (Model 4) was used to test the mediating effect (see Figure 2). As shown in Table 2, after controlling for gender and grade, family functioning significantly positively predicted self-esteem ($\beta = -0.51$, $p < 0.001$), and self-esteem significantly negatively predicted adolescent depression ($\beta = -0.58$, $p < 0.001$). The direct effect of family functioning on adolescent depression was significant ($\beta = -0.12$, $p < 0.001$). The bias-corrected percentile bootstrap method showed that family functioning had a significant indirect effect on adolescent depression through self-esteem: $ab = 0.30$, SE = 0.04, 95% CI = [−0.37, −0.23]. The mediating effect accounted for 71.43% of the total effect. Therefore, Hypothesis 2 is supported.

Testing for moderated mediation

Hypothesis 3 proposes that peer relationships play a moderating role in the relationship between self-esteem and adolescent depression. To verify this hypothesis, the PROCESS macro (Model 14) was used to test the moderating effect. As shown in Table 3, peer relationships negatively predicted adolescent depression ($\beta = -0.26$, $p < 0.001$). Peer relationships and self-esteem show significant interaction with adolescent depression ($\beta = -0.15$, $p < 0.001$). The bias-corrected percentile bootstrap method showed that peer relationships moderated the indirect effect of family functioning on adolescent depression, and the moderated mediation index was −0.19, SE = 0.03, 95%CI = [−0.26, −0.14]. When the peer relationship level was low (i.e., one SD below the mean), self-esteem significantly mediated the relationship between family functioning and adolescent depression, and the mediating index was $ab = -0.27$, 95%CI = [−0.35, −0.21]. At the same time, when the peer relationship level was high (i.e., one SD above the mean), self-esteem had a significant mediating effect on family functioning and adolescent depression, and the mediating index was $ab = -0.11$, 95%CI = [−0.17, −0.06].

To understand the essence of the moderating effect, a simple slope test was conducted (Aiken and West, 1991). As shown in Figure 3, self-esteem had a significant negative predictive effect on adolescent depression when peer relationships were low (i.e., one SD below the mean; $\beta_{simple} = -0.56$, $p < 0.001$). When the level of peer relationships was high (i.e., one SD above the mean), the negative predictive effect of self-esteem on adolescent depression decreased ($\beta_{simple} = -0.25$, $p < 0.001$). Therefore, high quality peer relationships can alleviate the impact of low self-esteem on adolescent depression; low quality peer relationships can increase the impact of low self-esteem on adolescent depression; and peer

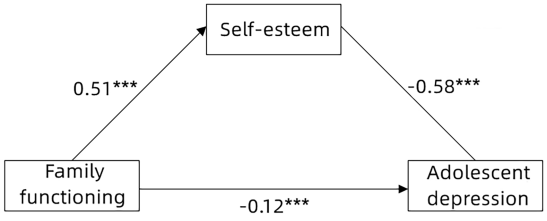

FIGURE 2
The mediating effect of self-esteem on the relationship between family functioning and adolescent depression. ***$P < 0.001$.

TABLE 3 Testing the moderated mediation effect of peer relationships on self-esteem and adolescent depression.

	Model 1 Self-esteem		Model 2 Adolescent depression	
	β	*t*	*β*	*t*
Gender	−0.05	−1.37	0.08	2.85**
Grade	−0.08	−2.26*	0.07	2.52*
Family functioning	0.51	13.90***	−0.08	2.32*
Self-esteem			−0.38	−9.01***
Peer relationships			−0.26	−6.48***
Self-esteem × peer relationship			0.15	6.57***
R^2	0.30		0.56	
F	78.40***		118.40***	

*$P < 0.05$, **$P < 0.01$ and ***$P < 0.001$.

TABLE 2 Testing the mediation effect of family functioning on adolescent depression.

	Model 1 Adolescent depression		Model 2 Self-esteem		Model 3 Adolescent depression	
	β	*t*	*β*	*t*	*β*	*t*
Gender	0.11	3.06**	−0.05	−1.37	0.09	2.76**
Grade	0.13	3.27**	−0.08	−2.26*	0.08	2.40*
Family functioning	−0.42	11.02***	0.51	13.90***	−0.12	−3.35***
Self-esteem					−0.58	−16.02***
R^2	0.24		0.30		0.48	
F	59.12***		78.40***		128.78***	

*$P < 0.05$, **$P < 0.01$ and ***$P < 0.001$.

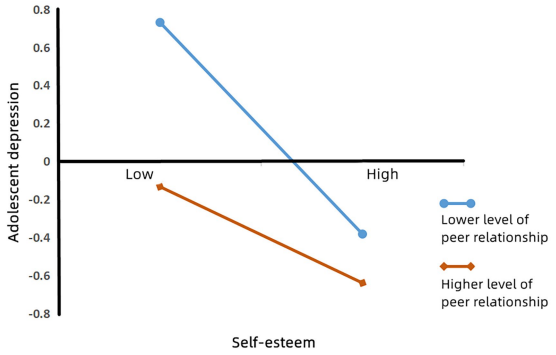

FIGURE 3
Model of test for simple slopes showing moderating influence of peer relationships on association between family functioning and adolescent depression.

relationships play a moderating role in the relationship between self-esteem and adolescent depression.

Discussion

Although family system theory and a large number of empirical studies support that family functioning plays an important role in the development, process, and relapse of adolescent depression (Keitner et al., 1995; Beavers and Hampson, 2000; Sireli and Soykan, 2016), there are few studies into the mediating and moderating mechanisms of family functioning on adolescent depression.

Based on ecological systems theory among others, this study explored the mediating role of self-esteem and the moderating role of peer relationships in the relationship between family functioning and adolescent depression.

The relationship between family functioning and adolescent depression

The current study found a significant negative correlation between family functioning and adolescent depression, which is consistent with Hypothesis 1. This result can be explained by the circumplex model of marital and family systems (Olson, 2000). Good family functioning can have a protective effect on adolescent mental health and reduce the risk of depression. High family cohesion can provide a warmer family environment and positive emotional support for adolescents, leading them to form good parent–child relationships and ultimately reducing the risk of depression (Edwards and Clarke, 2004). High family adaptability (or flexibility) can help adolescents effectively cope with the impacts of external negative life events and reduce their risk of depression (Nam et al., 2016). Good family communication can enhance family cohesion, adaptability, and help maintain the stability and balance of the family system, thus reducing the risk of depression in adolescents (Yee and Sulaiman, 2017). Conversely, poor family functioning increases the risk of depression in adolescents.

The mediating role of self-esteem

This study also found that self-esteem plays a mediating role in the relationship between family functioning and adolescent depression, confirming our Hypothesis 2. Self-esteem is a series of thoughts and feelings about an individual's own worth and importance (Rosenberg, 1965). As an evaluation and emotional dimension of self-concept, self-esteem is considered to be equal to self-respect, self-evaluation, and self-worth (Baumeister, 1997; Harter, 1999). Individuals with high self-esteem have more positive self-evaluation and self-experience, while those with low self-esteem experience more self-rejection, self-dissatisfaction, and self-contempt.

Family support, parental emotional warmth, and a positive parent–child relationship are all important factors influencing a child's self-esteem (Franco and Levitt, 1998; Bulanda and Majumdar, 2009; Peng et al., 2021a). According to the circumplex model of marital and family systems, family functions manifest primarily as family cohesion, adaptability (or flexibility), and communication, which can affect both adolescent depression and self-esteem. High family cohesion can result in children feeling loved, accepted, and supported, helping them form a good parent–child relationship, and lead to children themselves forming a more positive sense of self-evaluation. However, low family cohesion will result in children feeling rejection and neglect, forming bad parent–child relationships, and then causing the children form a negative sense of self-evaluation. High family adaptability helps family members understand their roles, functions, and power, as well as family expectations, and thus help children respond effectively to life events. By coping with events effectively and increasing their ability to control their environment, children become confident and develop a more positive sense of self-esteem (Rezaei-Dehaghani et al., 2015). Positive communication promotes positive self-esteem by reducing family conflict, enhancing family cohesion, and increasing adaptability.

Low self-esteem, however, is an significant risk factor for depression in adolescents. According to the vulnerability model of depression, individuals with low self-esteem display behavioral characteristics such as seeking excessive comfort or negative feedback and actively being socially avoidant, as well as internal characteristics such as ruminating about negative aspects of one's self which can then lead to depression (Orth et al., 2008). In addition, according to acceptance and commitment therapy, people with low self-esteem tended to show more cognitive fusion and experiential avoidance, both of which are also important causes of depression (Peng et al., 2021b).

The moderating role of peer relationships

This study found that peer relationships mediated the second stage of the indirect relationship between family functioning and adolescent depression through self-esteem, confirming our Hypothesis 3. Among adolescents with a low level of peer relationships, lower self-esteem was significantly associated with higher depressive symptoms. However, this relationship became weaker in adolescents with a high level of peer relationships. In other words, a high level of peer relationships can mitigate the effect of low self-esteem on adolescent depression.

This result is consistent with the stress buffering model of social support (Sarason et al., 1990; Rueger et al., 2016). When faced with life events, adolescents with low self-esteem are more likely to underestimate their ability to cope, which leads to greater stress and ultimately mental health problems such as depression. A high level of peer relationships can provide emotional support for those with low self-esteem, helping them cope with the stress brought on by negative self-evaluation, promoting the formation of a more positive self-concept and thereby alleviating the impact of low self-esteem on adolescent depression.

This result is consistent with the risk-enhancing hypothesis (Luthar et al., 2015) which assumes that one risk factor (e.g., low peer relationships) can exacerbate the negative effects of another risk factor (e.g., low self-esteem). Low peer relationships causes adolescents with low self-esteem to lack effective communication and support, making them more likely to believe in thoughts of negative self-evaluation and thus increasing the impact of low self-esteem on depression.

Limitations and practical implications

Although this study has begun to uncover the mediating and moderating mechanisms at work between family functioning and adolescent depression, there are still some limitations to the current study that need to be considered. First, this study is a cross-sectional design, which cannot reveal the change of variables over time. Future studies should consider using a cross-lagged panel model to analyze the mediating effect of longitudinal data. Second, the data in this study are collected by a self-report method which may have been affected by the social expectation effect. At the same time, the potential method variances were not controlled or examined. Future studies should consider using multi-channel collection (e.g., teacher or parent reports) to improve research validity. Third, the samples of this study are from only two middle schools from two provinces in China, so the results of this study cannot be extended to adolescents from other cultural backgrounds. Therefore, it is necessary to expand the sample in the future, and in particular to conduct research on adolescents from different cultural backgrounds.

Despite these limitations, however, the current study nonetheless has theoretical and practical significance. Theoretically, this study aimed to explore the moderated mediation mechanism between family functioning and adolescent depression, and expands the existing understandings of adolescent depression. It also improves our understandings of the mechanism at play in the relationship between family functioning and adolescent depression. From a practical point of view, this study provides guidance for adolescent depression prevention or intervention. First, consistent with previous findings, this study suggests that positive family functioning is an important protective factor for adolescent depression. Therefore, parents should enhance family cohesion, adaptability, and positive communication to ensure family functioning is as normal and effective as possible, so as to effectively limit the chances of depression in adolescents. Second, parents and schools should cultivate adolescents' positive self-esteem so that adolescents can effectively prevent depression through positive self-esteem. Third, considering the moderating role of peer relationships on the relationship between self-esteem and adolescent depression, schools should pay attention to the cultivation of multiple levels of positive peer relationships among adolescents to ensure that adolescents receive adequate peer support, so as to alleviate the impact of low self-esteem on adolescent depression.

Data availability statement

The data analyzed in this study is subject to the following licenses/restrictions: The datasets generated for this study are available upon request to the corresponding authors. Requests to access these datasets should be directed to pengbiao220@qq.com.

Ethics statement

The studies involving human participants were reviewed and approved by Guizhou Medical University. Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin.

Author contributions

XH, ZY, and BP designed the study protocol. XH drafted the manuscript. BP performed the statistical analysis and guided the first draft of the paper. ZY guided the interpretation of the results and edited the final manuscript. NH completed the literature review and participated in the study design and interpretation analysis. All authors contributed to the article and approved the submitted version.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

References

Abou-ezzeddine, T., Schwartz, D., Chang, L., Lee-Shin, Y., Farver, J., and Xu, Y. (2007). Positive peer relationships and risk of victimization in Chinese and south Korean children's peer groups. *Soc. Dev.* 16, 106–127. doi: 10.1111/j.1467-9507.2007.00374.x

Achenbach, T. M. (1991). *Manual for the Youth Self-Report and 1991 Profile*. Burlington: Department of Psychiatry, University of Vermont, 1–13.

Aiken, L. S., and West, S. G. (1991). *Multiple Regression: Testing and Interpreting Interactions*. Newbury Park, CA: Sage.

Asher, S. R., Hymel, S., and Renshaw, P. D. (1984). Loneliness in children. *Child Dev.* 55:1456. doi: 10.2307/1130015

Baumeister, R. F. (1997). "Identity, self-concept, and self-esteem: the self lost and found," in *Handbook of Personality Psychology*. eds. R. Hogan, J. A. Johnson and S. R. Briggs (New York, NY: Academic Press), 681–710.

Beavers, R., and Hampson, R. B. (2000). The Beavers systems model of family functioning. *J. Fam. Ther.* 22, 128–143. doi: 10.1111/1467-6427.00143

Bradshaw, J. (1996). *Bradshaw on: the family: a new way of creating solid self-esteem*. Florida: Health Communications, Inc.

Bronfenbrenner, U. (1989). Ecological systems theory. *Ann. Child Dev.* 6, 187–249. doi: 10.1007/978-0-387-79061-9_4406.

Bulanda, R. E., and Majumdar, D. (2009). Perceived parent–child relations and adolescent self-esteem. *J. Child Fam. Stud.* 18, 203–212. doi: 10.1007/s10826-008-9220-3

Cheng, K., You, Y., Ye, B., and Chen, Z. (2022). The relationship between family function and middle school students' suicide attitude. *Psychol. Dev. Educ.* 38, 272–278. doi: 10.16187/j.cnki.issn1001-4918.2022.02.14

Cohen, S., and Wills, T. A. (1985). Stress, social support, and the buffering hypothesis. *Psychol. Bull.* 98, 310–357. doi: 10.1037/0033-2909.98.2.310

Deng, J., Zhang, L., Cao, G., and Yin, H. (2021). Effects of adolescent academic stress on sleep quality: mediating effect of negative affect and moderating role of peer relationships. *Curr. Psychol.* 1–10. doi: 10.1007/s12144-021-01803-7

Dong, L., Yang, A., Zhou, T., and Huang, Z. (2022). Peer relationship and depression symptoms in adolescents: the mediating effect of core self-evaluationand social withdrawal. *Chin. J. Behav. Med. Brain Sci.* 31, 438–443. doi: 10.3760/cma.j.cn371468-20211115-00655

Edwards, B., and Clarke, V. (2004). The psychological impact of a cancer diagnosis on families: the influence of family functioning and patients' illness characteristics on depression and anxiety. *Psycho-Oncol. J. Psychol. Soc. Behav. Dimensions Cancer* 13, 562–576. doi: 10.1002/pon.773

Egger, H. L., Costello, J. E., and Angold, A. (2003). School refusal and psychiatric disorders: a community study. *J. Am. Acad. Child Adolesc. Psychiatry* 42, 797–807. doi: 10.1097/01.CHI.0000046865.56865.79

Franck, E., De Raedt, R., and De Houwer, J. (2007). Implicit but not explicit self-esteem predicts future depressive symptomatology. *Behav. Res. Ther.* 45, 2448–2455. doi: 10.1016/j.brat.2007.01.008

Franco, N., and Levitt, M. J. (1998). The social ecology of middle childhood: family support, friendship quality, and self-esteem. *Fam. Relat.* 47, 315–321. doi: 10.2307/585262

Gladstone, G. L., Parker, G. B., Mitchell, P. B., Wilhelm, K. A., and Malhi, G. S. (2005). Relationship between self-reported childhood behavioral inhibition and lifetime anxiety disorders in a clinical sample. *Depress. Anxiety* 22, 103–113. doi: 10.1002/da.20082

Guerrero-Muñoz, D., Salazar, D., Constain, V., Perez, A., Pineda-Cañar, C. A., and García-Perdomo, H. A. (2021). Association between family functionality and depression: a systematic review and meta-analysis. *Korean J. Family Med.* 42, 172–180. doi: 10.4082/kjfm.19.0166

Harter, S. (1999). *The Construction of the Self. A Developmental Perspective*. New York, NY: Guilford Press.

Hayes, A. F. (2013). *Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach*. New York, NY: Guilford Press.

Healy, K. L., and Sanders, M. R. (2018). Mechanisms through which supportive relationships with parents and peers mitigate victimization, depression and internalizing problems in children bullied by peers. *Child Psychiatry Hum. Dev.* 49, 800–813. doi: 10.1007/s10578-018-0793-9

Iverson, R. D., and Maguire, C. (2000). The relationship between job and life satisfaction: evidence from a remote mining community. *Hum. Relat.* 53, 807–839. doi: 10.1177/0018726700536003

Johnson, D., Dupuis, G., Piche, J., Clayborne, Z., and Colman, I. (2018). Adult mental health outcomes of adolescent depression: A systematic review. *Depress. Anxiety* 35, 700–716. doi: 10.1002/da.22777

Jona, C. M., Labuschagne, I., Mercieca, E. C., Fisher, F., Gluyas, C., Stout, J. C., et al. (2017). Families affected by huntington's disease report difficulties in communication, emotional involvement, and problem solving. *J. Huntington's dis.* 6, 169–177. doi: 10.3233/JHD-170250

Kashani, J. H., Allan, W. D., Dahlmeier, J. M., Rezvani, M., and Reid, J. C. (1995). An examination of family functioning utilizing the circumplex model in psychiatrically hospitalized children with depression. *J. Affect. Disord.* 35, 65–73. doi: 10.1016/0165-0327(95)00042-L

KavehFarsani, Z., Kelishadi, R., and Beshlideh, K. (2020). Study of the effect of family communication and function, and satisfaction with body image, on psychological well-being of obese girls: the mediating role of self-esteem and depression. *Child Adolesc. Psychiatry Ment. Health* 14, 39–10. doi: 10.1186/s13034-020-00345-3

Kawash, G., and Kozeluk, L. (1990). Self-esteem in early adolescence as a function of position within Olson's circumplex model of marital and family systems. *Soc. Behav. Personal. Int. J.* 18, 189–196. doi: 10.2224/sbp.1990.18.2.189

Keitner, G. I., Ryan, C. E., Miller, I. W., Kohn, R., Bishop, D. S., and Epstein, N. B. (1995). Role of the family in recovery and major depression. *Am. J. Psychiatry* 152, 1002–1008. doi: 10.1176/ajp.152.7.1002

Lee, Y., Kim, B. N., Park, M. H., and Park, S. (2017). Familial, cognitive, and behavioral characteristics of adolescents with depression. *J. Korean Acad. Child Adolescent Psychiat.* 28, 168–173. doi: 10.5765/jkacap.2017.28.3.168

Li, P., and Li, X. (2022). Effect of parent-adolescent communication frequency and primary caregiver's parenting style on adolescent depression of left-behind children. *Chin. J. Health Psychol.* 30, 944–950. doi: 10.13342/j.cnki.cjhp.2022.06.030

Lin, H. C., Tang, T. C., Yen, J. Y., Ko, C. H., Huang, C. F., Liu, S. C., et al. (2008). Depression and its association with self-esteem, family, peer and school factors in a population of 9586 adolescents in southern Taiwan. *Psychiatry Clin. Neurosci.* 62, 412–420. doi: 10.1111/j.1440-1819.2008.01820.x

Liu, X., Guo, C., Liu, L., Wang, A., Hu, L., Tang, M., et al. (1997). Reliability and validity of the youth self-report of Achenbach's behavior checklist. *Chin. Ment. Health J.* 11, 200–203.

Liu, F., Song, X., Shang, X., Wu, M., Sui, M., Dong, Y., et al. (2020). A meta-analysis of detection rate of depression symptoms among middle school students. *Chin. Ment. Health J.* 34, 123–128. doi: 10.3969/j.issn.1000-6729.2020.2.008

Liu, L., and Zhao, L. (2018). The effect of family functioning on anger: the mediating role of self-esteem. *J. Shanxi Univ. (Phil. Soc. Sci. Ed.)* 41, 139–144. doi: 10.13451/j.cnki.shanxi.univ(phil.soc.).2018.05.019

Lorenzo-Blanco, E. I., Meca, A., Unger, J. B., Romero, A., Gonzales-Backen, M., Piña-Watson, B., et al. (2016). Latino parent acculturation stress: longitudinal effects on family functioning and youth emotional and behavioral health. *J. Fam. Psychol.* 30, 966–976. doi: 10.1037/fam0000223

Luthar, S. S., Grossman, E. J., and Small, P. J. (2015). "Resilience and adversity," in *Handbook of child Psychology and Developmental Science: Socioemotional Processes*. eds. M. E. Lamb and R. M. Lerner (Hoboken, NJ: John Wiley & Sons, Inc.).

Man, Y., Mengmeng, L., Lezhi, L., Ting, M., and Jingping, Z. (2017). The psychological problems and related influential factors of left-behind adolescents (LBA) in Hunan, China: a cross sectional study. *Int. J. Equity Health* 16, 163–112. doi: 10.1186/s12939-017-0639-2

Mao, Z., Min, H., and Zhao, X. (2015). Adolescent-parent perceptions of family functioning and adolescent psychological well being. *Chin. J. Behav. Med. Brain Sci.* 24, 371–373. doi: 10.3760/cma.j.issn.1674-6554.2015.04.026

Merkaš, M., and Brajša-Žganec, A. (2011). Children with different levels of hope: are there differences in their self-esteem, life satisfaction, social support, and family cohesion? *Child Indic. Res.* 4, 499–514. doi: 10.1007/s12187-011-9105-7

Nam, B., Kim, J. Y., DeVylder, J. E., and Song, A. (2016). Family functioning, resilience, and depression among north Korean refugees. *Psychiatry Res.* 245, 451–457. doi: 10.1016/j.psychres.2016.08.063

Olson, D. H. (2000). Circumplex model of marital and family systems. *J. Fam. Ther.* 22, 144–167. doi: 10.1111/1467-6427.00144

Olson, D. H., Waldvogel, L., and Schlieff, M. (2019). Circumplex model of marital and family systems: An update. *J. Fam. Theory Rev.* 11, 199–211. doi: 10.1111/jftr.12331

Orth, U., Robins, R. W., and Roberts, B. W. (2008). Low self-esteem prospectively predicts depression in adolescence and young adulthood. *J. Pers. Soc. Psychol.* 95, 695–708. doi: 10.1037/0022-3514.95.3.695

Peng, B., Hu, N., Yu, H., Xiao, H., and Luo, J. (2021a). Parenting style and adolescent mental health: The chain mediating effects of self-esteem and psychological inflexibility. *Front. Psychol.* 12:738170. doi: 10.3389/fpsyg.2021.738170

Peng, B., Xiao, H., He, Z., Xiang, W., Zhang, C., Yao, Z., et al. (2021b). Effect of parental rejection on depression in middle school students: The chain mediating effect of self-esteem and psychological inflexibility. *Chin. J. Clin. Psych.* 29, 773–777. doi: 10.16128/j.cnki.1005-3611.2021.04.022

Rezaei-Dehaghani, A., Paki, S., and Keshvari, M. (2015). The relationship between family functioning and self-esteem in female high school students of Isfahan, Iran, in 2013–2014. *Iran. J. Nurs. Midwifery Res.* 20, 371–377.

Roley, M. E., Kawakami, R., Baker, J., Hurtado, G., Chin, A., and Hovey, J. D. (2014). Family cohesion moderates the relationship between acculturative stress and depression in Japanese adolescent temporary residents. *J. Immigr. Minor. Health* 16, 1299–1302. doi: 10.1007/s10903-013-9959-5

Rosenberg, M. (1965). *Society and the Adolescent Self-Image*. Princeton: Princeton University Press.

Rowe, R., Maughan, B., and Eley, T. C. (2006). Links between antisocial behavior and depressed mood: The role of life events and attributional style. *J. Abnorm. Child Psychol.* 34, 283–292. doi: 10.1007/s10802-006-9032-0

Rubin, C., Rubenstein, J. L., Stechler, G., Heeren, T., Halton, A., Housman, D., et al. (1992). Depressive affect in "normal" adolescents: relationship to life stress, family, and friends. *Am. J. Orthopsychiatry* 62, 430–441. doi: 10.1037/h0079352

Rueger, S. Y., Malecki, C. K., Pyun, Y., Aycock, C., and Coyle, S. (2016). A meta-analytic review of the association between perceived social support and depression in childhood and adolescence. *Psychol. Bull.* 142, 1017–1067. doi: 10.1037/bul0000058

Sarason, I. G., Sarason, B. R., and Pierce, G. R. (1990). Social support: The search for theory. *J. Soc. Clin. Psychol.* 9, 133–147. doi: 10.1521/jscp.1990.9.1.133

Schwartz, D., Tom, S. R., Chang, L., Xu, Y., Duong, M. T., and Kelly, B. M. (2010). Popularity and acceptance as distinct dimensions of social standing for Chinese children in Hong Kong. *Soc. Dev.* 19, 681–697. doi: 10.1111/j.1467-9507.2009.00558.x

Shao, R., He, P., Ling, B., Tan, L., Xu, L., Hou, Y., et al. (2020). Prevalence of depression and anxiety and correlations between depression, anxiety, family functioning, social support and coping styles among Chinese medical students. *BMC Psychol.* 8, 38–19. doi: 10.1186/s40359-020-00402-8

Sheeber, L. B., Davis, B., Leve, C., Hops, H., and Tildesley, E. (2007). Adolescents' relationships with their mothers and fathers: associations with depressive disorder and subdiagnostic symptomatology. *J. Abnorm. Psychol.* 116, 144–154. doi: 10.1037/0021-843X.116.1.144

Shi, X., Wang, J., and Zou, H. (2017). Family functioning and internet addiction among Chinese adolescents: The mediating roles of self-esteem and loneliness. *Comput. Hum. Behav.* 76, 201–210. doi: 10.1016/j.chb.2017.07.028

Sireli, O., and Soykan, A. A. (2016). Examination of relation between parental acceptance-rejection and family functioning in adolescents with depression/Depresyonu olan ergenlerin anne-baba kabul-red algilari ve aile islevleri acisindan incelenmesi. *Anadolu Psikiyatri Dergisi* 17, 403–411. doi: 10.5455/apd.179441

Smilkstein, G. (1978). The family APGAR: a proposal for a family function test and its use by physicians. *J. Fam. Pract.* 6, 1231–1239.

Steiger, A. E., Allemand, M., Robins, R. W., and Fend, H. A. (2014). Low and decreasing self-esteem during adolescence predict adult depression two decades later. *J. Pers. Soc. Psychol.* 106, 325–338. doi: 10.1037/a0035133

Tang, A. M., Deng, X. L., Du, X. X., and Wang, M. Z. (2018). Harsh parenting and adolescent depression: mediation by negative self-cognition and moderation by peer acceptance. *Sch. Psychol. Int.* 39, 22–37. doi: 10.1177/0143034317709066

Wang, J. (2006). *The Relationships Among Peer Interactions, General Self Efficacy and Mental Health of College Students*. Wuhan: Central China Normal University.

Wang, R., Dong, Y., Tan, R., Wu, M., Hua, R., and Zhuang, S. (2019). Study on relationship between adolescents' internet addition tendency and family environment. *Chin. Nurs. Res.* 33, 1832–1836. doi: 10.12102/j.issn.1009-6493.2019.11.003

Wei, J., Zhang, J., and Mao, X. (2018). Psychometric properties of Rosenberg self-esteem scale-revised for middle school students. *Chin. J. Clin. Psychol.* 26, 629–637. doi: 10.16128/j.cnki.1005-3611.2018.04.001

World Health Organization. (2017). *Depression and Other Common Mental Disorders: Global Health Estimates*. Geneva: World Health Organization.

Xu, F., and Zhang, W. (2011). Relationship between adolescents' alienation and pathological internet use: testing the moderating effect of family functioning and peer acceptance. *Acta Psychol. Sin.* 43, 410–419. doi: 10.3724/SP.J.1041.2011.00410

Yan, Z., and Li, S. (2021). The association of empathy on depression: the moderating effect of peer-relationship. *Stud. Psychol. Behav.* 19, 424–430. doi: 10.3969/j.issn.1672-0628.2021.03.020

Yee, N. Y., and Sulaiman, W. S. W. (2017). Resilience as mediator in the relationship between family functioning and depression among adolescents from single parent families. *Akademika* 87, 111–122. doi: 10.17576/akad-2017-8701-08

Yen, C. F., Yang, P., Wu, Y. Y., and Cheng, C. P. (2013). The relation between family adversity and social anxiety among adolescents in Taiwan: effects of family function and self-esteem. *J. Nerv. Ment. Dis.* 201, 964–970. doi: 10.1097/NMD.0000000000000032

Zahra, S. T., and Saleem, S. (2020). Family cohesion and depression in adolescents: A mediating role of self-confidence. *J. Pak. Med. Assoc.* 71, 677–680. doi: 10.47391/JPMA.1384

Zhang, Y. (2008). *The Test of Correlation Between Self-Concept and School Adjustment*. Xian: Northwest University.

Zhang, G., Dai, B., and Lei, L. (2013). The development of pathological internet use and its relationship with self-esteem among junior high school students: The moderating role of classmate relationship. *Acta Psychol. Sin.* 45, 1345–1354. doi: 10.3724/SP.J.1041.2013.01345

Zhou, K., Sun, X., Zhao, D., Tian, Y., and Fan, C. (2015). The development of peer relationship in childhood. *Psychol. Dev. Educ.* 31, 62–70. doi: 10.16187/j.cnki.issn1001-4918.2015.01.09

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Longitudinal impact of parent-teacher relationship on middle school students' academic achievements in China

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Objective: The study aims to discuss the longitudinal impact of the parent-teacher relationship on students' academic achievements in China.

Method: Based on the China Education Panel Survey, covering the data from 438 classes of 112 schools in 28 county-level administrative areas in China, we used the hierarchical linear model to analyze the data.

Results: We found that the parents' active communication with teachers, parents' participation in parent meetings, teachers' active contact, whether parents are afraid to communicate with teachers, and parents' willingness to participate in parent meetings have significant relationships with students' academic achievements. At the class level, the extent of teachers' stress from parents' requests and teachers' perception of respect from parents also affected students' academic achievements significantly in the Chinese context.

Conclusion: There was a longitudinal association between the parent-teacher relationship and students' academic achievements. The practical implication was discussed in the paper.

KEYWORDS

parent-teacher relationship, middle school, academic achievements, mainland China, hierarchical linear model

Introduction

Family and school are two important environments closely related to adolescents, and cooperation between the two greatly impacts adolescents' development (Lohman et al., 2007; Guo and Zhang, 2015). The Chinese government realizes the importance of home-school cooperation and has recently promulgated a series of policy documents to promote home-school cooperation. In 2017, the "School Management Standards for

Compulsory Education" proposed that harmonious relationships among family, school, and community should be built to enhance parents' participation in school governance and form a joint effort to educate people (Ministry of Education, 2017). Although the government is attaching increasing importance to home-school cooperation, there are still many problems with parent-teacher relationships in China. For example, the status of parents and teachers is unequal, showing the characteristics of a one-way communication model, a single form of cooperation under which parents lack the initiative to speak and where the communication channels are not smooth between parents and teachers (Zhang, 2011; Yang and Liu, 2012). Since parents and teachers are the two crucial participants in a child's education, their interactions heavily influence child outcomes (Serpell and Mashburn, 2012). Especially the parent-teacher relationship is critical to the children's social-emotional development (Lang et al., 2020) and their academic outcome (Kim and Hill, 2015). Despite existing research having paid attention to the association between parent-teacher relationships and students' academic outcomes, little is known about the long-term effects of parent-teacher relationships on students' outcomes; especially in China, most classroom teachers teach the same class of students from the enrollment to graduation in middle schools. Therefore, it is essential to investigate whether the impacts of parent-teacher relationships could be carried over. Together, the current study aims to discuss the longitudinal impact of the parent-teacher relationship on students' academic achievements in China.

The influence of parent-teacher relationships on students' development

Dozens of studies show that good family school relationships can promote students' academic achievements and positively impact students' growth (Garcia, 2004; Pomerantz et al., 2007; Zhang, 2011; Kim and Hill, 2015; Herman and Reinke, 2017). According to the Ecological systems theory (Bronfenbrenner, 1979; Bronfenbrenner and Morris, 1998), adolescent development is influenced directly by the interactions that take place within a single microsystem (such as the family, school, or peer group), as well as the similarities and differences in the pattern of the interactions that occur across these systems. Family and school are the two most important environments closely associated with adolescent development (Lohman et al., 2007; Santana et al., 2016).

Research shows that not all family school relationships are good for students (Pomerantz et al., 2007), and it depends on whether parents and teachers have good relations (Nir and Ami, 2005; Emerson et al., 2012; Liang, 2015). Only a relationship based on mutual trust and honesty can rich and frequent interaction be conducive to the development of students (Constantino, 2003; Garcia, 2004). A good relationship between parents and teachers can provide consistent support for students, making students more likely to recognize the benefits of learning (Harris and Goodall, 2009; Emerson et al., 2012). Waller (1932) points out that parents and teachers are natural enemies, not natural collaborators. The complex and crucial connection between families and schools is embodied in the relationships between individual teachers and their students' families (Driessen et al., 2005; Cole, 2013).

The connotation of the parent-teacher relationship

Good parent-teacher relationships are generally effective at maximizing students' potential, based on the mutually rich and frequent interactions built upon trust and honesty (Constantino, 2003; Garcia, 2004). According to interpersonal communication theory, the interpersonal relationship measurement can be classified into two variables. The first is the dimension of parent-teacher contact, which considers the individual's judgment of the relationship, such as the frequency of communication, the content, and means of communication, and the efforts the other may make to maintain the relationship. The second is the parent-teacher relationship quality, which mainly refers to the intensity of this judgment and is the perception of the intensity of the former (Dillard et al., 1999). Generally, an individual's perception of the quality of a relationship comes directly from the state of the communication, such as the frequency of communication and the degree of self-disclosure. Relationships develop over time through a process of self-disclosure (Bylund et al., 2012). Moreover, a relationship comes from the perception of the individual's influence on others, such as how much influence an individual can have on the decisions or behaviors of others and their evaluation of others as individuals (Zhang, 2016). Such that, there is a difference between parent-teacher contact and the parent-teacher relationship quality. Parent-teacher contact refers to the frequency of interactions between parents and teachers, whereas the parent-teacher relationship quality refers to the quality of their relationship as well as how well their goals are aligned (Serpell and Mashburn, 2012; Stormont et al., 2013; Deng et al., 2018).

In parent-teacher contact, the frequency of ties and activities between families and schools influences the relationship between parents and teachers (Zhao and Hong, 2012). The more connections and activities between families and schools are built and held, the better the relationship between teachers and parents will be (Adams and Christenson, 2000; Minke, 2006). The more frequent the interaction between parents and teachers, the more likely parents are to pass on their educational expectations to their children, thus promoting students' improvement at the cognitive level and success in academic achievement (Goyette and Xie, 1999;

Sebastian and Allensworth, 2012). Parents' participation in parental meetings, voluntary school activities, and initiatives where they learn from teachers about their children's learning or behavior can significantly improve their student's access to school (Perna and Titus, 2005; Pong et al., 2005). Regular parental meetings encourage parents to spend more time helping students and supervising school work, which is beneficial to improving students' test scores and plays an important role in student attitudes and behaviors (Islam, 2019). Together, parents' participation in parental meetings, school activities, and teacher contact has a significant positive impact on students with low academic achievements. Furthermore, parental behavior can help students understand the importance that their parents attach to school as well as to their learning behavior (Cheng and Li, 2015; Li, 2017).

In addition, parent-teacher relationship quality variables means the perception of self-influence on others, such as the extent to which one influences other people's decisions, actions, or evaluations (Zhang, 2016). The subjective relationship quality in the parent-teacher relationship refers to the parents' and teachers' emotional perception of the parent-teacher interaction. On the one hand, if parents do not experience a welcoming environment or support from teachers, their participation in constructing the parent-teacher relationship will be reduced. On the other hand, whether teachers receive due respect has a connection to the teachers' work enthusiasm and students' academic performance (Chen, 2008). If parents exhibit negative emotions toward the parent-teacher relationship, it will be harder to construct an excellent parent-teacher relationship (Tao, 2016). So, the emotional experience has an important impact on the parent-teacher relationship and students' academic performance.

The parent-teacher relationship in mainland China

Previous studies have shown that contact and communication between teachers and parents are not frequent enough in China (Li, 2013; Zhu and Gao, 2014; Zhang, 2018). It is also possible that schools in China are usually closed, and school-based communication is dominated by schools (Ma, 2010; Li, 2013). Therefore, parents' participation in school education is limited. At present, the parent-teacher relationship in China is usually manifested by a teacher telling parents about their children's behavior in school, and then the parents participate in their children's school education accordingly (Li, 2013; Huang, 2016). From there, most of the links between teachers and parents occur when a student exhibits bad performance, and parents naturally hope that the fewer links there are, the better everyone will be (Zhang, 2003). On the other hand, teachers report that their relationships with parents are a major source of occupational stress (Grolnick and Seal, 2008; Pepe and Addimando, 2013, 2014). Teachers feel more unpleasant experiences are involved in dealing with parent relationships than in other aspects of teaching (Hargreaves and Fullan, 1998).

Although many research studies have shown that the parent-teacher relationship has an important impact on student's academic achievements (Hill and Tyson, 2009), the parent-teacher relationship in home-school cooperation has escaped the attention of many Chinese researchers, especially in regard to the lack of quantitative research. There are some limitations on the previous study on the topic. Firstly, the existing studies focus on the status of the parent-teacher relationship and the association between the parent-teacher relationship and students' academic outcome at a certain period (Yuan et al., 2019), that is the use of cross-sectional data. And the long-term effect of the parent-teacher relationship on academic achievement is rare. The unique current social culture and educational environment of mainland China may limit the generalizations of dominant Western research findings on the parent-teacher partnership in China (Deng et al., 2018). Especially the teachers in a public school in China will widely be in charge of the same classes in the middle school; that is, the same teachers teach students in the 3 years of middle school in China, which may lead to the parent-teacher relationship having a carry-over impact. Since teachers will teach the same class for a long time, the original parent-teacher relationship may give parents and teachers a fixed impression, which will have a long-term impact on their interaction, and then have a long-term impact on students' performance (Deng et al., 2018). Secondly, previous studies take the parent-teacher relationship as a whole variable while didn't discuss the influence of the parent-teacher relationship at a different level. Assessing different aspects of the parent-teacher relationship may provide more detailed evidence to improve the parent-teacher relationship. Therefore, this paper attempts to address the gaps by aiming to examine the longitudinal association between the parent-teacher relationship and students' academic achievements in China.

Adolescent development involves various factors, including the social, emotional, and cognitive aspects of the transition from childhood to adulthood (Jaggers et al., 2015). Compared with the performance at the primary school stage, middle school students' academic performance tends to decline because of the great changes in puberty and their environment (Steinberg and Silk, 2002; Barber and Olsen, 2004; Keating, 2004; Lerner and Steinberg, 2004; Smetana et al., 2004; Hill and Chao, 2009). Additionally, the independence of middle school students in all aspects has gradually increased, resulting in a less close parent-teacher relationship than the one that exists in kindergartens and primary schools, and effective cooperation may be reduced (Seginer, 2006). Therefore, it is worthwhile to use middle school students as research subjects to explore the association between the parent-teacher relationship and middle school students'

developmental outcomes in the context of mainland China as well as the evidence-based potential practical strategies.

This study employs the hierarchical linear model (HLM) to discuss the association between the parent-teacher relationship and middle school students' academic achievements by analyzing China Education Panel Survey (CEPS) data, which is a large-scale, nationally representative, longitudinal public database. Two questions were addressed in this study to enhance our understanding of the parent-teacher relationship in mainland China:

(1) Does the parent-teacher relationship have a carry-over impact on middle school students' academic achievements at the parent-child dyad level[1]?
(2) Does the parent-teacher relationship have a carry-over impact on middle school students academic achievements at the class level?

Methodology

Data source

The data used in this study are from a large-scale longitudinal study [2013–2014 school year (Wave 1)] and [2014–2015 school year (Wave 2)] of the CEPS, a project conducted by the National Survey Research Center (NSRC) at the Renmin University of China. The respondents were middle school students in seventh grade and ninth grade. The sampling method was stratified random sampling based on the average education level and the proportion of migrants in the whole population. In addition, the respondents included parents, teachers, and school administrators. The survey covered 438 classes from 112 schools in 28 county-level administrative areas throughout the country; due to the compulsory education law (Ministry of Education, 2021) in China, the government administrates compulsory education mainly at the county level. The CEPS survey can represent the overall education situation in China. The questionnaire survey procedure starts with the investigator of NSRC contacting the principals at the selected middle schools and then collecting the students' data by questionnaire.

The students' ability scores were compiled according to the national students' cognitive ability on a 20-item test designed by NSRC, which includes the ability of language, graph, calculation, and logic. The score ranges from 0 to 20. It was completed on the spot in class and was strictly time-controlled. The answers were collected and sealed on the spot. The principals then arranged for the related teachers to fill out the questionnaire to collect the teachers' data. After that, the head teachers of the selected classes asked the parents to fill out the questionnaire. Finally, the questionnaire was mailed to NSRC after it was collected by the head teachers. Many studies have analyzed and discussed the problems of education in China based on these data (e.g., Huang, 2016; Wu, 2016; Zhang, 2016; Li and Zheng, 2017; Pan and Zhang, 2017; Tong, 2017; Wei and Ma, 2017; Zhao et al., 2017; Fang, 2018; Liang et al., 2018). The data are very rich, including basic personal information, students' situations in school, parent-child interactions, and home-school interactions, all of which can provide information for us to further study the impacts of the parent-teacher relationship on students' academic achievements.

In this study, we used the data of students in Grade 7 to analyze the carry-over impact of the parent-teacher relationship on students' achievements for middle school students in China, since the students in seventh grade have the follow-up data 1 year later. After excluding incomplete samples, the sample size of students (parents) was 8,426, and the sample size of classes was 185.

Variables

Data used in the current study were collected from three sources, including a child's responses, responses from one of his/her parents, and responses from his/her classroom teachers. Therefore, we classified variables into two levels, parent-child dyad level and class level.

Student variables

Students' academic achievement of 2014–2015 (wave-2) was the dependent variable and cognitive ability simultaneously served as a control variable.

Regarding Students' academic achievement (SAA), CEPS collected students' original mid-term Chinese, math, and English scores in the autumn semester of 2014, which schools provided. Since the full raw scores of each subject were different across schools, we computed students' academic scores *via* dividing their gained raw scores by the full raw scores, indicating the percentage of correct of each subject, and then the averaged percentage of correct of three subjects was computed as a measure of students' SAA. The students' cognitive ability scores were compiled according to the national students' cognitive ability on a 20 items test designed by NSRC, which includes the ability of language, graph, calculation, and logic. The score ranges from 0 to 20. Also, Students' gender was included as a control variable.

Parent-teacher relationship variables

This study measured the parent-teacher relationship on two levels: child-level and class-level. They were all collected in the

1 Parent-child dyad refers to the pairing of a child with his/her parents.

2013–2014 school year (wave-1). At the parent-child dyad level, parents reported in five following questions:

(1) Parents' participation. Do this child's parents attend the parent meeting this semester? There were four options, including (a)The school held one, and the parents did attend; (b) The school held one, but the parents didn't attend; (c) Not held yet, but the parents are going to attend once held; and (d)Not held yet, and the parents are not going to attend if held. We recoded (a) and (c) as 1 to represent parents' active attitude on it. (See PP in Table 1).
(2) Frequency of parents contact with teachers actively. How many times have this child's parents contacted the teacher at school this semester? Parents responded it on a 4-point scale (1 = Never, 2 = Once, 3 = Two to four times, and 4 = Five times or more). (See PCTA in Table 1).
(3) Frequency of teachers contact with parents actively. How many times has this child's teacher contacted the parents this semester? Parents responded it on a 4-point scale (1 = Never, 2 = Once, 3 = Two to four times, and 4 = Five times or more). (See TCTA in Table 1).
(4) Parents' afraid. Are you afraid of communicating with the school teacher? Parents reported it on a 3-point scale (1 = Quite afraid, 2 = A little bit afraid, and 3 = Not afraid at all). (See PA in Table 1).
(5) Parents cooperate with the teacher's requirement. To what extent could you meet the requirement this semester if the teachers require the parents to check their child's homework, such as writing "checked," signing names, etc.? Parents responded it on a 4-point scale (1 = Complete, 2 = Mostly, 3 = Rarely, and 4 = Not at all). (See PCTR in Table 1).

At the class level, the classroom teacher responded to three questions to represent the parent-teacher relationship of a particular classroom.

TABLE 1 Research variables.

Levels	Variables		Codes
Level 1: Parent-child dyad level Responses from Child and Parents	Wave 2 student academic achievement	W2-SAA	Average scores across Chinese, Math, and English
	Wave 2 Cognitive ability	W2-CA	Standardized total score of the student's cognitive ability test estimated by the three parameter IRT model.
	Student gender	SG	0 = female, 1 = male
	Parental education level	PEL	1 = no education, 2 = primary school, 3 = secondary school, 4 = technical secondary school, 5 = vocational high school, 6 = high school, 6 = associate degree, 7 = bachelor, 8 = master and above
	Family economic status	FES-C1	Difficult reference group
		FES-C2	Medium
		FES-C3	Rich
	Wave 1 parents' participation/willing to participate in parents' meeting	PP	0 = non-participation, 1 = participation
	Wave 1 frequency of parents contact with teachers actively in this semester	PCTA	1 = none, 2 = once, 3 = two to four times, 4 = five times and above
	Wave 1 frequency of teachers contact with parents actively in this semester	TCPA	1 = none, 2 = once, 3 = two to four times, 4 = five times and above
	Wave 1 extent of parents' afraid of communicating with teachers	PA	1 = quite afraid, 2 = a little bit afraid, 3 = not afraid at all
	Wave 1 parents cooperate with the teacher's requirement	PCTR	1 = complete, 2 = mostly, 3 = rarely, 4 = not at all
Level 2: class-level Responses from teachers	Wave 1 teachers gender	TG	0 = female, 1 = male
	Wave 1 numbers of parents that teachers know	NPTK	1 = all most none, 2 = a few, 3 = half of a class, 4 = most of a class, 5 = every parent of a class
	Wave 1 extent if teachers' stress from parents' request	TSPR	1 = not at all, 2 = to a small extent, 3 = to a general extent, 4 = to a large extent, 5 = to an extremely large extent
	Wave 1 teachers' perception of respect from parents	TPRP	1 = none, 2 = just a few, 3 = about a half, 4 = more than half, 5 = all of them
	Wave 1 teaching experiences	TA	Mean = 15, SD = 8.97, Median = 14

Note. Wave 1 = 2013–2014 school year, Wave 2 = 2014–2015 school year.

(1) Numbers of parents that teachers know. How many parents of your students do you know about? Teachers responded it on a 5-point scale (1 = None, 2 = Just a few, 3 = About a half, 4 = More than half, and 5 = All of them). (See NPTK in **Table 1**).
(2) Teachers' stress from parents' request. How much pressure do you have concerning the requirements of students' parents. Teachers responded it on a 5-point scale (1 = None, 2 = Low, 3 = Moderate, 4 = High, and 5 = Very high). (See TSRP in **Table 1**).
(3) Teachers' perception of respect from parents. Generally speaking, how many parents of your students pay respect to you? Teachers responded it on a 5-point scale (1 = None, 2 = Just a few, 3 = About a half, 4 = More than half, and 5 = All of them). (See TPRP in **Table 1**).

In line with existing research, the measures of the parent-teacher relationship also reflected both the parent-teacher contact and parent-teacher relationship quality. More specifically, parents' active communication with teachers, teachers' active contact with parents, parents' participation in parental meetings, the number of parents that the teacher knows, and how parents cooperate with the teacher's requirements represented the parent-teacher contact. Meanwhile, whether parents are afraid to communicate with teachers, teachers' stress from parents' requests and teachers' perception of respect from parents reflect parent-teacher relationship quality.

Besides the aforementioned variables, we also included parental education level, family economic status (FES), teachers' gender, and teachers' teaching experience (The cumulative time for teachers to engage in teaching work which is measured by year) as control variables. To be noted, we merged the FES into three categories (Difficulty, Medium, and Rich) from a five-category variable (very difficult, some difficult, medium, rich, and very rich) from the original database by merging the first two categories and last two categories due to the small numbers in the first and last categories. (See **Table 1** for details).

Analysis method

Due to the data hierarchy, where students were nested in the classroom, the HLM was adopted to account for the dependency among students in the same classroom. Considering that there are only two classes in each grade in each school, it is not suitable to construct a three-level model of student, class, and school. This paper uses a two-level HLM as the analysis model. Level 1 is the parent-child dyad level, and students' gender, cognitive abilities, parents reported parent-teacher relationship variables, FES used as the predictors. Considering that categorized variables cannot be directly used in the HLM, a dummy coding method was used to transform the FES into two dummy variables. More specially, the first categorical of FES (FES-C1, difficulty level) was set as the reference level, and then two dummy variables, FES.C2 and FES.C3, represented medium and rich levels, respectively, were created.

Level 2 is the class level, and the teachers reported that parent-teacher variables were used as class-level predictors. In addition, corresponding child-level predictors were aggregated at the class level to separate level-1 and level-2 effects (Hoffman, 2015, pp. 344).

Model

We followed the step-up model-building approach as suggested by Raudenbush and Bryk (2002) in the current study.

Step 1: a null model with no predictors were tested to estimate the interclass correlation of the outcome variables.

Model 0:

$$\text{Level} - 1 \text{ Model} : Y_{ij} = \beta_{0j} + r_{ij} \quad (1)$$

$$\text{Level} - 2 \text{ Model} : \beta_{0j} = \gamma_{00} + u_{0j} \quad (2)$$

In this model, j represents different classes; i stands for different students; Y_{ij} corresponds to the academic achievement of student i in class j; β_{0j} is the mean of the students' academic achievements in class j; r_{ij} is the difference between student i and the class mean; $\text{Var}(r_{ij})$ reflects the random error at the student/parent level; γ_{00} is the mean of all students' academic achievements; u_{0j} is the difference between the class mean and the all-student mean; and $\text{Var}(u_{0j})$ reflects the error of the class level.

Step 2: a random intercept model was tested with all level-1 predictors centered at the class mean and corresponding level-2 predictors by aggregating at the class-level to separate level-1 and level-2 effects (Hoffman, 2015, pp. 344).

$$\begin{aligned}&\text{Level} - 1 \text{ Model} :\\ &Y_{ij} = \beta_{0j} + \beta_{1j}(\text{SG})_{ij} + \beta_{2j}(\text{W2CA})_{ij} + \beta_{3j}(\text{PEL})_{ij}\\ &+\beta_{4j}(\text{FES.C2})_{ij} + \beta_{5j}(\text{FES.C3})_{ij} + \beta_{6j}(\text{PP})_{ij} + \beta_{7j}(\text{PCTA})_{ij}\\ &+\beta_{8j}(\text{TCPA})_{ij} + \beta_{9j}(\text{PA})_{ij} + \beta_{10j}(\text{PCTR})_{ij} + r_{ij} \quad (3)\end{aligned}$$

$$\begin{aligned}&\text{Level} - 2 \text{ Model} :\\ &\beta_{0j} = \gamma_{00} + \gamma_{01}(\text{SGCM})_j + \gamma_{02}(\text{W2CACM})_j + \gamma_{03}(\text{PELCM})_j\\ &+\gamma_{04}(\text{FES.c2CM})_j + \gamma_{05}(\text{FES.c3CM})_j + \gamma_{06}(\text{PPCM})_j\\ &+\gamma_{07}(\text{PCTACM})_j + \gamma_{08}(\text{TCPACM})_j + \gamma_{09}(\text{PACM})_j\\ &+\gamma_{010}(\text{PCTRCM})_j + u_{0j} \quad (4)\end{aligned}$$

$$\beta_{kj} = \gamma_{1k} \quad (5)$$

Where, k represents the k^{th} level-1 predictors, $k \in [1, 10]$, meaning no random slopes were specified in this step.

Since SG was a categorical variable and the female as the reference group, the percentage of male students in each classroom was calculated as the level-2 predictor (SGCM). Similarly, the percentage of FES.C2 and FES.C3 at each classroom were computed as the level-2 predictors.

Step 3: a series of random slope models were tested to examine which level-1 coefficients varied significantly across classrooms *via* conducting a likelihood ratio test to compare models with and without the random slopes.

$$\begin{aligned}&\text{Level}-1\ \text{Model}:\\&Y_{ij}=\beta_{0j}+\beta_{1j}(\text{SG})_{ij}+\beta_{2j}\,(\text{W2CA})_{ij}+\beta_{3j}\,(\text{PEL})_{ij}\\&+\beta_{4j}\,(\text{FES.C2})_{ij}+\beta_{5j}\,(\text{FES.C3})_{ij}+\beta_{6j}(\text{PP})_{ij}+\beta_{7j}(\text{PCTA})_{ij}\\&+\beta_{8j}\,(\text{TCPA})_{ij}+\beta_{9j}(\text{PA})_{ij}+\beta_{10j}(\text{PCTR})_{ij}+r_{ij}\end{aligned}\tag{6}$$

$$\begin{aligned}&\text{Level}-2\ \text{Model}:\\&\beta_{0j}=\gamma_{00}+\gamma_{01}(\text{SGCM})_j+\gamma_{02}\,(\text{W2CACM})_j+\gamma_{03}\,(\text{PELCM})_j\\&+\gamma_{04}\,(\text{FES.c2CM})_j+\gamma_{05}\,(\text{FES.c3CM})_j+\gamma_{06}(\text{PPCM})_j\\&+\gamma_{07}(\text{PCTACM})_j+\gamma_{08}\,(\text{TCPACM})_j+\gamma_{09}(\text{PACM})_j\\&+\gamma_{010}(\text{PCTRCM})_j+u_{0j}\end{aligned}\tag{7}$$

$$\beta_{kj}=\gamma_{10}+\mu_{kj}\tag{8}$$

Where, k represents the k^{th} level-1 predictors, $k \in [1, 10]$, μ_{kj} indicates random slopes were specified in this step. Only the significant random slopes were kept to keep the model as parsimony as possible.

Step 4: class-level predictors were added to models to examine if these class-level predictors could explain the variance of random intercept.

$$\begin{aligned}&\text{Level}-1\ \text{Model}:\\&Y_{ij}=\beta_{0j}+\beta_{1j}(\text{SG})_{ij}+\beta_{2j}\,(\text{W2CA})_{ij}+\beta_{3j}\,(\text{PEL})_{ij}\\&+\beta_{4j}\,(\text{FES.C2})_{ij}+\beta_{5j}\,(\text{FES.C3})_{ij}+\beta_{6j}(\text{PP})_{ij}+\beta_{7j}(\text{PCTA})_{ij}\\&+\beta_{8j}\,(\text{TCPA})_{ij}+\beta_{9j}(\text{PA})_{ij}+\beta_{10j}(\text{PCTR})_{ij}+r_{ij}\end{aligned}\tag{9}$$

$$\begin{aligned}&\text{Level}-2\ \text{Model}:\\&\beta_{0j}=\gamma_{00}+\gamma_{01}(\text{SGCM})_j+\gamma_{02}\,(\text{W2CACM})_j+\gamma_{03}\,(\text{PELCM})_j\\&+\gamma_{04}\,(\textit{FES.c2CM})_j+\gamma_{05}\,(\textit{FES.c3CM})_j+\gamma_{06}(\textit{PPCM})_j\\&+\gamma_{07}(\textit{PCTACM})_j+\gamma_{08}\,(\textit{TCPACM})_j+\gamma_{09}(\textit{PACM})_j\\&+\gamma_{010}(\text{PCTRCM})_j+\gamma_{011}(\text{TSPR})_j+\gamma_{012}(\text{NPTK})_j\\&+\gamma_{013}(\text{TPRP})_j+\gamma_{014}(\text{TA})_j+\gamma_{015}(\text{TG})_j+u_{0j}\end{aligned}\tag{10}$$

$$\beta_{kj}=\gamma_{10}+\mu_{kj}\tag{11}$$

Step 5: class-level predictors were added to models to examine if these class-level predictors could explain the variance of random slopes.

$$\begin{aligned}&\text{Level}-1\ \text{Model}:\\&Y_{ij}=\beta_{0j}+\beta_{1j}(\text{SG})_{ij}+\beta_{2j}\,(\text{W2CA})_{ij}+\beta_{3j}\,(\text{PEL})_{ij}\\&+\beta_{4j}\,(\text{FES.C2})_{ij}+\beta_{5j}\,(\text{FES.C3})_{ij}+\beta_{6j}(\text{PP})_{ij}+\beta_{7j}(\text{PCTA})_{ij}\\&+\beta_{8j}\,(\text{TCPA})_{ij}+\beta_{9j}(\text{PA})_{ij}+\beta_{10j}(\text{PCTR})_{ij}+r_{ij}\end{aligned}\tag{12}$$

$$\begin{aligned}&\text{Level}-2\ \text{Model}:\\&\beta_{0j}=\gamma_{00}+\gamma_{01}(\text{SGCM})_j+\gamma_{02}\,(\text{W2CACM})_j+\gamma_{03}\,(\text{PELCM})_j\\&+\gamma_{04}\,(\text{FES.c2CM})_j+\gamma_{05}\,(\text{FES.c3CM})_j+\gamma_{06}(\text{PPCM})_j\\&+\gamma_{07}(\text{PCTACM})_j+\gamma_{08}\,(\text{TCPACM})_j+\gamma_{09}(\text{PACM})_j\\&+\gamma_{010}(\text{PCTRCM})_j+\gamma_{011}(\text{TSPR})_j+\gamma_{012}(\text{NPTK})_j\\&+\gamma_{013}(\text{TPRP})_j+\gamma_{014}(\text{TA})_j+\gamma_{015}(\text{TG})_j+u_{0j}\end{aligned}\tag{13}$$

$$\begin{aligned}\beta_{kj}=\ &\gamma_{k0}+\gamma_{111}(\text{TSPR})_j+\gamma_{112}(\text{NPTK})_j+\gamma_{113}(\text{TPRP})_j\\&+\gamma_{114}(\text{TA})_j+\gamma_{115}(\text{TG})_j+\mu_{kj}\end{aligned}\tag{14}$$

Where, γ_{111} to γ_{115} represented the class-level coefficients for examining the variance in the random slopes. Only the significant coefficients would be kept in the final model.

Results

The following results are shown based on the empirical analysis of the above survey data.

Descriptive statistics

Table 2 shows the summary of the 8,426 students (parents), including results from both the child and class levels. **Table 3** shows the descriptive statistics of the 185 classes.

Multilevel results

Results from step 1 (model 0)

From model 1 in **Table 4**, we can see that the mean of the students' class academic achievements is 65.54 ($p < 0.001$), the variance of the students (σ^2) is 513.9, and the variance of the classes is 157.9 ($p < 0.001$), thus ICC = 0.42, indicating that the application of the HLM to statistical analysis must be considered (Wen, 2009).

TABLE 2 Description statistics of 8,426 child and parents.

Variables	Value	No. of cases	%
Parent-child dyad level			
SG	Female	4,006	47.54
	Male	4,420	52.46
FES	Difficult	1,538	18.25
	Medium	6,314	74.93
	Rich	543	6.44
	Missing	31	0.37
PP	Non-participation in parents' meeting	770	9.14
	Parents' participation/willing to participate in parents' meeting	7,412	87.97
	Missing	244	2.90
		Mean	SD
W2-SAA	Wave 2 student academic achievement	65.30	19.26
W2-CA	Wave 2 cognitive ability	0.35	0.82
PEL	Highest parent's education level	4.68	2.08
PCTA	Wav 1 frequency of parents contact with teachers actively in this semester	2.37	1.01
TCPA	Wave 1 frequency of teachers contact with parents actively in this semester	2.11	1.00
PA	Wave 1 extent of parents' afraid of communicating with teachers	2.79	0.43
PCTR	Wave 1 parents cooperate with the teacher's requirement	1.84	0.92
Class level			
SGCM	Wave 1 percentage of male students	0.52	0.07
FES.c2CM	Wave 1 percentage of difficult family	19.15	17.10
FES.c3CM	Wave 1 percentage of medium family	75.22	15.07
	Wave 1 percentage of rich family	7.48	5.44
PPCM	Wave 1 percentage of Parents' participation/willing to participate in parents' meeting	0.91	0.11
W2CACM	Class mean of W2CA	0.34	0.48
PELCM	Class mean of PEL	4.69	1.23
PCTACM	Class mean of PCTA	2.37	0.35
TCPACM	Class mean of TCPA	2.11	0.35
PACM	Class mean of PA	2.79	0.09
PCTRCM	Class mean of PCTR	1.65	0.28

Note. Wave 1 = 2013–2014 school year, Wave 2 = 2014–2015 school year.

Results from step 2 (model 1)

The results of model 2 in Table 4 show that the fixed effects of the control variables on the parent level: the average score of the classes is 0.143 ($p < 0.05$) after controlling all the other variables; boys have significantly lower academic achievements than girls ($\gamma_{01} = -5.08$, $p < 0.001$); as expected, cognitive ability is positively related to students' academic achievements ($\gamma_{02} = 11.05$, $p < 0.001$); and the parents' education level is positively related to students' academic achievements ($\gamma_{03} = 0.59$, $p < 0.001$). The effect of FES is not significant. Parents' willingness to participate in parental meetings to discuss students' academic achievements have significantly higher academic achievements than those showing unwillingness ($\gamma_{06} = 2.84$, $p < 0.001$). Students who had parents communicating more with teachers have significantly higher academic achievements ($\gamma_{07} = 0.48$, $p < 0.01$).

Teachers who actively communicate with parents have significantly lower academic achievements than those who do not actively communicate with parents ($\gamma_{08} = -1.83$, $p < 0.001$). Parents who were not afraid of communicating

TABLE 3 Descriptive statistics of 185 classes.

Variables		No. of cases	%
TG	Female	128	69.19
	Male	57	30.81
		Mean	SD
TA	Wave 1 teacher experiences	16.92	7.16
TSPR	Wave 1 extent of teachers' stress from parents' request	15.00	8.97
NPTK	Wave 1 numbers of parents that teachers know	3.58	0.87
TPRP	Wave 1 teachers' perception of respect from parents	3.82	0.98

Note. Wave 1 = 2013–2014 school year, Wave 2 = 2014–2015 school year.

TABLE 4 Multilevel result.

	Model 0	Model 1	Model 1.1	Model 2	Model 3
Fixed effects					
Level 1-child level					
Intercept	65.540.94**	77.4722.68**	77.6222.63**	48.7123.39*	49.5523.39*
SG		−5.080.31**	−5.050.31**	−5.060.32**	−5.060.32**
CA		11.050.24**	11.020.23**	11.030.24**	11.030.24**
FES.C2		0.280.48	0.210.48	0.140.49	0.140.48
FES.C3		−0.330.73	−0.330.73	−0.460.74	−0.470.74
PEL		0.590.09**	0.570.09**	0.560.09**	0.560.09**
PCTR		−1.750.19**	−1.760.19**	−1.720.19**	−1.730.19**
PP		2.840.66**	2.820.65**	2.940.67**	2.920.67**
PCTA		0.480.18**	0.450.18*	0.410.19*	0.410.19*
TCPA		−1.830.19**	−1.770.22**	−1.780.23**	−1.950.91*
PA		3.090.37**	2.920.43**	2.990.43**	−1.821.79
Level 2-class level					
SGCM		−6.018.61	−6.728.58	−7.918.42	−7.798.42
W2CACM		14.241.8**	14.331.8**	13.311.83**	13.331.83**
FES.c2CM		0.020.07	0.030.07	−0.020.06	−0.020.06
FES.c3CM		0.280.13*	0.290.13*	0.230.13	0.230.13
PELCM		0.020.81	0.060.8	0.620.79	0.620.79
PCTRCM		−4.472.61	−4.162.61	−3.272.55	−3.32.55
PPCM		−4.878.97	−5.088.94	−1.148.93	−1.078.93
PCTACM		1.242.54	1.332.53	2.182.58	2.172.58
TCPACM		−0.042.44	0.12.44	−0.442.49	−0.412.49
PACM		−3.316.65	−3.776.64	2.426.76	2.376.76
TSPR				−1.660.74*	−1.670.74*
NPTK				0.560.7	0.410.7
TPRP				2.151.02*	2.131.02*
TA				0.120.07	0.120.07
TG				−0.131.39	−0.131.39
TCPA*NPTK					0.040.23
PA*NPTK					1.240.45**
Random effects					
level 2 intercept	157.9	53.39	53.47	49.01	48.98
level 2 slope-TCPA			2.21	2.28	2.29
level 2 slope-PA			5.89	5.98	4.65
Level 1 residual	213.9	130.18	127.06	128.10	128.10

Note. SG, student gender; FES, family economic status; PP, Wave 1 parents' participation/willing to participate in parents' meeting; W2-CA, Wave 2 students' cognitive ability; PEL, Highest parent's education level; PCTA, Wave 1 frequency of parents contact with teachers actively in this semester; TCPA, Wave 1 frequency of teachers contact with parents actively in this semester; PA, Wave 1 extent of parents' afraid of communicating with teachers; PCTR, Wave 1 parents cooperate with the teacher's requirement; SGCM, Wave 1 percentage of male students; FES.c2CM, Wave 1 percentage of medium family; FES.c3CM, Wave 1 percentage of rich family; PPCM, Wave 1 percentage of Parents' participation/willing to participate in parents' meeting; W2CACM, Class mean of W2CA; PELCM, Class mean of PEL; PCTACM, Class mean of PCTA; TCPACM, Class mean of TCPA; PACM, Class mean of PA; PCTRCM, Class mean of PCTR; TG, teacher gender; TA, Wave 1 teacher experiences; TSPR, Wave 1 extent of teachers' stress from parents' request; NPTK, Wave 1 numbers of parents that teachers know; and TPRP, Wave 1 teachers' perception of respect from parents. *$p < 0.05$; **$p < 0.01$.

with teachers have significantly higher academic achievements than those who are not afraid ($\gamma_{09} = 3.09$, $p < 0.001$). students with parents who had less cooperation with the teachers' requirements have significantly lower academic achievements ($\gamma_{010} = -1.75$, $p < 0.05$). At the classroom level, we can find that the class level cognitive ability is significantly positive, indicating that a higher level of class level of cognitive ability is associated with a higher level of academic achievement on average. Even though individual-level FES is not significantly associated with students' achievement, the class-level percentage of rich families is significantly positively related to students'

achievement. Together, these results indicate that, in the same class, student's FES did not impact his/her academic achievement; however, a student in a classroom with a higher percentage of rich families would have a higher academic achievement score.

The results of random effects are as follows: the class's mean academic achievements variance was reduced to 53.39, and the individual residual variance was reduced to 130.18 after including both level-1 and level-2 predictors. Accordingly, level-1 $R^2 = 0.39$, and level-2 $R^2 = 0.66$, indicating that a total of 39% of the level-1 variance and 66% of level-2 variance have been explained.

Results from step 3 (model 1.1)

In this step, we tested a series of models to identify which level-1 coefficients varied across classrooms. As a result, we identified that TCPA and PA effects varied across classrooms. The fixed effects were kept the same as in the last model.

Results from step 4 (model 2)

In this step, class-level teacher predictors are included in the model to explain the variance of the class mean of students' achievement scores. As shown in **Table 4**, we found that the extent to if teachers' stress from parents' requests is significantly negatively associated with the class mean of students' academic scores, indicating the higher levels of stress teachers perceived, the lower average scores the class had. Also, teachers' perception of parents' respect significantly impacts class-level academic scores. Regarding the random effects, the variance of the class means academic achievements was reduced to 49.01 from 53.47. Accordingly, level-1 $R^2 = 0.40$, and level-2 $R^2 = 0.66$, indicating the effects of class-level predictors were very small.

Results from step 5 (model 3)

In this step, we tested if class-level predictors could significantly explain the variations of random slopes by including cross-level interactions between parent and teacher predictors. More specifically, if the number of parents that teachers know as class-level predictors could explain the effects of the frequency of teachers contact with parents actively and extent of parents' afraid of communicating with teachers as child-level predictors (TCPA*NPTK and PA*NPTK). The results show that the numbers of parents that teachers knew are significantly positively associated with the slope of the extent of parents' afraid of communicating with teachers, indicating that when teachers knew more parents, the impacts of the extent of parents' afraid of communicating with teachers become more positive, as a result, parents had lower levels of afraid of communicating with teachers. Accordingly, level-1 $R^2 = 0.40$, and level-2 $R^2 = 0.69$, as expected, level-2 variances have been further explained by adding these cross-level interactions.

Discussion

In this paper, we focus on the association between the parent-teacher relationship and the student's achievements, aiming to analyze the carry-over impact of the parent-teacher relationship on students' achievements for middle school students in China. The HLM was applied to analyze two levels of variables: the parent-child dyad level and class level. Therefore, we organize discussions about the associations of these two levels of variables, including child-level variables and class-level variables, of the parent-teacher relationship with students' academic achievements.

The carry-over impact of the parent-teacher relationship on students' academic achievements at the parent-child dyad

For the parent-teacher relationship, the degree and form of parent-teacher contact are strongly associated with students' academic achievement. Students with parents who participated in parental meetings and actively communicated with teachers had higher academic achievement, which a large number of studies have proved (e.g., Goyette and Xie, 1999; Adams and Christenson, 2000; Sebastian and Allensworth, 2012). The frequency of parent-teacher interaction could pass on educational expectations to their children, then contribute to their academic achievements.

The cooperation from parents to supervise their children to complete teachers' assignments was an important way for parents to engage in their children's schooling (Cook et al., 2018), which was supported by our findings as well. More specifically, results showed that the less the parents cooperated with teachers' requirements, the lower students' academic scores were.

Our results also showed that parental participation in parent-teacher meetings is also positively related to students' academic achievements.

On the one hand, parental participation in parent-teacher meetings reflects the level of parent involvement in children's learning to some extent. The positive relationship between parental involvement in their children's education and students' success in school is widely documented in the research literature (Fan and Chen, 2001; Barnard, 2004; Todd and Wolpin, 2007; Houtenville and Conway, 2008; Cheung and Pomerantz, 2011). On the other hand, evidence also suggests that some schools failed to fully engage parents and provide them with information about their children's learning and how they are performing in school (Noel et al., 2013). Therefore, it is critical for parents to actively keep themselves informed about their children's classroom

activities, events, and requirements by communicating with teachers actively.

However, we found that parents reported teachers' active communication with parents had negative relationships on students' academic performance, which might be because, in the face-to-face communication between parents and teachers, teachers always have the clear aim of reflecting on the students' misconduct and requesting that parents cooperate with regulations (Xiong, 2007; Zhang, 2011). If parents are informed of their children's misconduct in China, they tend to criticize them verbally or even scold them since the children are supposed to obey the rules of parents. So that, telling parents about bad behavior is a punishment in Chinese published schools, which may aggravate students' negative emotions, further affecting their academic performance. The relationship between teachers and parents in China is protagonist-supporting as a result of the current education system in China, which is oriented toward a screening function rather than a cultivation function (An, 2005), leading to strengthening the importance of exams and the status of teachers (An, 2005; Peterson et al., 2011). Although policymakers, administrators, and teachers have gradually realized the vital role of parental participation, parents' involvement in children's education is still in its initial stage in China (Wu et al., 2017).

The carry-over impact of the parent-teacher relationship on students' academic achievements at the class level

The results of model 3 showed that teachers' perception of respect from parents and the extent of teachers' stress from parents' requests were significantly associated with academic achievement. The higher levels of stress teachers perceived from parents' requests, the lower academic achievement; meanwhile, the higher levels of respect teachers perceived from parents, the higher average academic performance. Similar to previous meta-analysis findings, high teachers' stress level is linked to poor student outcomes, and the parent-teacher relationship is one of the main sources of teacher stress (Cameron and André, 2005). Also, having parents' respect is a well-known protective factor for teacher retention (Ouyang and Paprock, 2006; Canter, 2009).

In addition, results reveal the random effects of the extent of parents' afraid of communicating with teachers could be explained by the number of parents that teacher knew; the more parents the teacher knew, the lower level of fear that parents felt about communicating with teachers would become more positive. Together, the results echo that a good parent-teacher relationship link to good academic performance of students. However, the random effects also reveal the non-negligible variation across classrooms. Teachers can teach so many students that they are not familiar with all their children and their parents (Sizer, 1992; Meier, 2005), especially when there are many large classes (more than 56 students in a class) in China (Zhou and Xian, 2012; Zhang, 2013; Fu and Xu, 2018). Hu and Luo (2014) investigated large classes in two cities in Guangxi Province and found that large classes were more abundant in middle and high schools than in primary schools; the number of students in the largest class was 103. Therefore, some classes make it difficult for teachers to be familiar with each student's parents in China. Yang (2006) found 45.2% of parents contacted teachers when their children fell behind, 19.4% of whom contacted the teacher when their children exhibited problem behavior, while 13.7% took the initiative to communicate with teachers only when the children had special conditions (such as sickness, incomprehension of fees, opinions on teaching methods, and corporal punishment). Thus, the current results also highlight the inequity of education resources, especially the human resources of teachers, in middle schools.

Practical implication

We found the parent-teacher relationship has a carry-over impact on middle school students' academic achievements both at the parent-child dyad level and at the class level. It's important to take measures to promote the parent-teacher relationship for middle school students. First, teachers should develop an equal dialogue with parents and guide parents to take the initiative to participate in school education. It's critical to express welcome and affirmation for parents' involvement and avoid parents having fear of communication with teachers. Second, parents should expand the communication channels with teachers, including the participation in school activities, volunteer activities, and so on. Third, the schools should provide a creative, open, inclusive atmosphere to attract parents to participate in the children's education and timely communication with the school about the student's important performance. Promote the healthy interaction between parents and teachers to form a habit and even become a part of the school culture.

Limitations and future research directions

Some limitations of this research should be noted. First, the results concerning ethnicity should be interpreted with caution, as all minorities were treated as one group. Second, the data only covered students in seventh grade, and the influence of the parent-teacher relationship may be different for students in other grades (Fan, 2021). With the increase of grade, children's autonomy gradually improves, and their openness to parents' opinions gradually decreases, resulting in a decline in the influence of parental involvement on middle school children (Gao, 2016).

To address these issues, future research should attempt to compare the differences in the influence of parent-teacher relationships in different grades. Moreover, with the emphasis on students' comprehensive quality development in China, students' development is not limited to academic success but also career and social development. Thus, future studies are needed to examine the impact of the parent-teacher partnership on other cognitive, behavioral, and social outcomes as well as the linking mechanisms among Chinese students.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent from the patients/participants was not required to participate in this study in accordance with the national legislation and the institutional requirements.

Author contributions

WF conceived the study, conducted the analysis, took the lead on drafting the manuscript and revised it critically for important intellectual content. QP analyzed the data and revised it critically for important intellectual content. YY contributed to the design of the work and wrote the draft of the manuscript. GC interpreted data for the work and wrote the draft of the manuscript. All authors gave final approval of the version to be published and agree to be accountable of all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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References

Adams, K. S., and Christenson, S. L. (2000). Trust and the family–school relationship examination of parent–teacher differences in elementary and secondary grades. *J. Sch. Psychol.* 38, 477–497. doi: 10.1016/S0022-4405(00)00048-0

An, Z. (2005). Leading role and supporting role: Analysis of the relationship between primary and secondary school teachers and parents. *Contemp. Educ. Sci.* 1, 13–15.

Barber, B. K., and Olsen, J. A. (2004). Assessing the transitions to middle and high school. *J. Adolesc. Res.* 19, 3–30. doi: 10.1177/0743558403258113

Barnard, W. M. (2004). Parent involvement in elementary school and educational attainment. *Child. Youth Serv. Rev.* 26, 39–62. doi: 10.1016/j.childyouth.2003.11.002

Bronfenbrenner, U. (1979). *The Ecology of Human Development: Experiments by Nature and Design*. Cambridge, MA: Harvard University Press.

Bronfenbrenner, U., and Morris, P. A. (1998). "The ecology of developmental processes," in *Handbook of Child Psychology: Theoretical Models of Human Development*, (eds) W. Damon and R. Lerner (Hoboken, NJ: John Wiley), 993–1028.

Bylund, C. L., Peterson, E. B., and Cameron, K. A. (2012). A practitioner's guide to interpersonal communication theory: An overview and exploration of selected theories. *Patient Educ. Couns.* 87, 261–267. doi: 10.1016/j.pec.2011.10.006

Cameron, M., and André, A. R. (2005). A Meta-Analysis for Exploring the Diverse Causes and Effects of Stress in Teachers. *Can. J. Educ.* 28, 458–486. doi: 10.2307/4126479

Canter, L. (2009). *Parents On Your Side: A Teacher's Guide to Creating Positive Relationships With Parents Second Edition*. Bloomington: Solution Tree Press, 37.

Chen, Z. X. (2008). Reflection of reform of performance assessment system of university teachers in China. *Pract. Theory Educ.* 28, 29–31.

Cheng, L., and Li, H. J. (2015). The effect of the perception of teacher's class behavior and parental involvement on learning strategies of 10- to 12-year-old low achievers. *Chinese J. Special Educ.* 7, 47–52.

Cheung, S. S., and Pomerantz, E. M. (2011). Parents' involvement in children's learning in the United States and China: Implications for children's academic and emotional adjustment. *Child Dev.* 82, 932–950. doi: 10.1111/j.1467-8624.2011.01582.x

Cole, K. E. (2013). *Teachers Working with Families: Natural Enemies or Necessary Allies?*, Ph.D thesis, New York, NY: The City University of New York

Constantino, S. (2003). *Engaging all Families: Creating a Positive School Culture by Putting Research into Practice*. Oxford, UK: Rowan & Littlefield Education.

Cook, D. K., Dearing, E., and Zachrisson, H. D. (2018). Is parent–teacher cooperation in the first year of school associated with children's academic skills and behavioral functioning? *Int. J. Early Child.* 50, 211–226.

Deng, L. Y., Zhou, N., Nie, R. H., Jin, P. P., Yang, M. X., and Fang, X. Y. (2018). Parent-teacher partnership and high school students' development in mainland China: The mediating role of teacher-student relationship. *Asia Pac. Educ. Rev.* 38, 15–31. doi: 10.1080/02188791.2017.1361904

Dillard, J. P., Solomon, D. H., and Palmer, M. T. (1999). Structuring the concept of relational communication. *Commun. Monogr.* 66, 49–65. doi: 10.1080/03637759909376462

Driessen, G., Smit, F., and Sleegers, P. (2005). Parental involvement and educational achievement. *Br. J. Educ. Res.* 31, 509–532. doi: 10.1080/01411920500148713

Emerson, E., Donenberg, G. R., and Wilson, H. W. (2012). Health-protective effects of attachment among African American girls in psychiatric care. *J. Fam. Psychol.* 26, 124–132. doi: 10.1037/a0026352

Fan, X., and Chen, M. (2001). Parental involvement and students' academic achievement: A meta-analysis. *Int. J. Exp. Educ.* 70, 27–61. doi: 10.1080/00220970109599497

Fan, Y. (2021). A meta-analysis of the relationship between parental involvement and children's academic achievement. *Modern Basic Educ. Res.* 22, 56–64.

Fang, C. C. (2018). Family background, extracurricular tutoring and students' non-cognitive ability: Evidence from CEPS. *Forum Contemp. Educ.* 17, 39–46.

Fu, C. K., and Xu, M. (2018). Dilemma and path of governance of large class in urban schools: Based on the practical experience of governance as a whole plan of Qingdao and Chengdu. *Theory Pract. Educ.* 38, 38–42.

Gao, Y. (2016). The influence of parental educational involvement on academic achievement of primary and secondary school students: The moderating role of family socioeconomic status. *J. Meas. Eval. Educ. Psychol.* 9, 40–46.

Garcia, D. C. (2004). Exploring connections between the construct of teacher efficacy and family involvement practices: Implications for urban teacher preparation. *Urban Educ.* 39, 290–315. doi: 10.1177/0042085904263205

Goyette, K., and Xie, Y. (1999). Educational expectations of Asian American youths: Determinants and ethnic differences. *Sociol. Educ.* 72, 22–36. doi: 10.2307/2673184

Grolnick, W. S., and Seal, K. (2008). *Pressured Parents, Stressed-Out Kids: Dealing with Competition While Raising a Successful Child*. Amherst, NY: Prometheus Press.

Guo, Z. K., and Zhang, Y. X. (2015). The status and countermeasures of parents' absence in family-school cooperation. *J. Manag. Educ.* 32, 20–23.

Hargreaves, A., and Fullan, M. (1998). *What's Worth Fighting for Out There?*. New York, NY: Teachers College Press.

Harris, A., and Goodall, J. S. (2009). *Helping Families Support Children's Success at School: Review of the Evidence*. London: Save the Children.

Herman, K. C., and Reinke, W. M. (2017). Improving teacher perceptions of parent involvement patterns: Findings from a group randomized trial. *Sch. Psychol. Q.* 32:89. doi: 10.1037/spq0000169

Hill, N. E., and Chao, R. K. (2009). *Families, Schools, and the Adolescent: Connecting Research, Policy, and Practice*. New York, NY: Teachers College Press.

Hill, N. E., and Tyson, D. F. (2009). Parental involvement in middle school: A meta-analytic assessment of the strategies that promote achievement. *Dev. Psychol.* 45, 740–763. doi: 10.1037/a0015362

Hoffman, L. (2015). *Longitudinal analysis: Modeling within-person fluctuation and change*. New York, NY: Routledge.

Houtenville, A. J., and Conway, K. S. (2008). Parental effort, school resources, and student achievement. *J. Hum. Resour.* 43, 437–453.

Hu, Y., and Luo, D. H. (2014). The present situation, causes and outlet of the "big class size" in basic education schools: Based on the survey of Yulin City and Guigang City in Guangxi. *Modern Educ. Sci.* 10, 35–38.

Huang, L. (2016). An empirical study on the influence of parents' participation in school education on middle school students' cognitive performance: Based on CEPS. *Educ. Sci. Res.* 27, 53–59.

Islam, A. (2019). Parent-teacher meetings and student outcomes: Evidence from a developing country. *Eur. Econ. Rev.* 111, 273–304. doi: 10.1016/j.euroecorev.2018.09.008

Jaggers, J. W., Church, W. T., Tomek, S., Hooper, L. M., Bolland, K. A., and Bolland, J. M. (2015). Adolescent development as a determinant of family cohesion: A longitudinal analysis of adolescents in the mobile youth survey. *J. Child Fam. Stud.* 24, 1625–1637. doi: 10.1007/s10826-014-9966-8

Keating, D. P. (2004). "Cognitive and brain development," in *Handbook of Adolescent Psychology*, (2nd Edn), eds R. Lerner and L. Steinberg (Hoboken, NJ: John Wiley & Sons Inc.), 45–84.

Kim, S. W., and Hill, N. E. (2015). Including fathers in the picture: A meta-analysis of parental involvement and students' academic achievement. *J. Educ. Psychol.* 107, 919–934. doi: 10.1037/edu0000023

Lang, S. N., Jeon, L., Schoppe-Sullivan, S., and Wells, M. B. (2020). Associations between Parent-Teacher Cocaring Relationships, Parent-Child Relationships, and Young Children's Social Emotional Development. *Child Youth Care Forum* 49, 623–646. doi: 10.1007/s10566-020-09545-6

Lerner, R. M., and Steinberg, L. (2004). *Handbook of Adolescent Psychology*, (2nd Edn). Hoboken, NJ: John Wiley & Sons Inc. doi: 10.1002/9780471726746

Li, L. J. (2013). Study on problems and countermeasures of family-school cooperation based on questionnaire survey. *J. Educ. Dev.* 34, 23–26.

Li, X. (2017). Students' happiness: Evaluation results and inspiration from PISA2015. *J. World Educ.* 31, 23–29.

Li, X. H., and Zheng, L. (2017). Family socioeconomic status and parental involvements: Impacts and mechanisms. *China Econ. Rev.* 2, 86–104.

Liang, W. Y., Ye, X. M., and Li, T. (2018). How does parental involvement affect the cognitive ability of migrant children: An empirical study based on CEPS. *J. Educ. Stud.* 14, 80–94.

Liang, Y. H. (2015). A qualitative study of teacher-parent conflict and conflict management. *J. Educ. Stud.* 36, 62–76.

Lohman, B. J., Kaura, S. A., and Newman, B. M. (2007). Matched or mismatched environments? The relationship of family and school differentiation to adolescents' psychosocial adjustment. *Youth Soc.* 39, 3–32. doi: 10.1177/0044118X06296637

Ma, Y. M. (2010). *Only by Reading Can we Succeed: Study on Parents' Educational Expectation*, Ph.D thesis, Beijing: Peking University.

Meier, D. (2005). "Authenticity and educational change," in *Extending Educational Change*, ed. A. Hargreaves (New York: Springer Netherlands), 316–335.

Ministry of Education (2017). *School Management Standards for Compulsory Education*. Available online at: http://www.moe.gov.cn/srcsite/A06/s3321/201712/t20171211_321026.html (accessed November 26, 2021).

Ministry of Education (2021). *Compulsory Education Law of the People's Republic of China*. Available online at: http://www.gov.cn/guoqing/2021-10/29/content_5647617.htm

Minke, K. M. (2006). "Parent–teacher relationships," in *Children's Needs III: Development, Prevention, and Intervention*, eds G. G. Bear and K. M. Minke (Washington, DC: National Association of School Psychologists).

Nir, A. E., and Ami, T. B. (2005). School-parents relationship in the era of school-based management: Harmony or conflict? *Leadership Policy Sch.* 4, 55–72.

Noel, A., Stark, P., Redford, J., and Zukerberg, A. (2013). *Parent and Family Involvement in Education, From the National Household Education Surveys Program of 2012*. Washington, DC: National Center for Education Statistics.

Ouyang, M., and Paprock, K. (2006). *Teacher Job Satisfaction and Retention: A Comparison Study between the US and China*. Available online at: https://files.eric.ed.gov/fulltext/ED492688.pdf (accessed October 30, 2022).

Pan, Y. H., and Zhang, R. B. (2017). Multi-level analysis of influencing factors of middle school class teacher's job satisfaction: Based on CEPS. *Educ. Res. Monthly* 10, 67–74.

Pepe, A., and Addimando, L. (2013). Comparison of occupational stress in response to challenging behaviors between general and special education primary teachers in Northern Italy. *Int. J. Spec. Educ.* 28, 14–26.

Pepe, A., and Addimando, L. (2014). Teacher-parent relationships: Influence of gender and education on organizational parents' counterproductive behaviors. *Eur. J. Psychol. Educ.* 29, 503–519. doi: 10.1007/s10212-014-0210-0

Perna, L. W., and Titus, M. A. (2005). The relationship between parental involvement as social capital and college enrollment: An examination of racial/ethnic group differences. *J. High. Educ.* 76, 485–518. doi: 10.1353/jhe.2005.0036

Peterson, E. R., Rubie-Davies, C. M., Elley-Brown, M. J., Widdowson, D. A., Dixon, R. S., and Irving, E. S. (2011). Who is to blame? Students, teachers and parents views on who is responsible for student achievement. *Res. Educ.* 86, 1–12. doi: 10.7227/RIE.86.1

Pomerantz, E. M., Moorman, E. A., and Litwack, S. D. (2007). The how, whom, and why of parents' involvement in children's academic lives: More is not always better. *Rev. Educ. Res.* 77, 373–410. doi: 10.3102/003465430305567

Pong, S. L., Hao, L., and Gardner, E. (2005). The roles of parenting styles and social capital in the school performance of immigrant Asian and Hispanic adolescents. *Soc. Sci. Q.* 86, 928–950. doi: 10.1111/j.0038-4941.2005.00364.x

Raudenbush, S. W., and Bryk, A. S. (2002). *Hierarchical linear models: Applications and data analysis methods*, 2nd Edn. Thousand Oaks, CA: Sage Publications, Inc, 68–94.

Santana, L. E., Feliciano, L., and Jiménez, A. B. (2016). Perceived family support and the life design of immigrant pupils in secondary education. *Revista de Educ.* 372, 35–62.

Sebastian, J., and Allensworth, E. (2012). The influence of principal leadership on classroom instruction and student learning: A study of mediated pathways to learning. *Educ. Adm. Q.* 48, 626–663. doi: 10.1177/0013161X11436273

Seginer, R. (2006). Parents' educational involvement: A developmental ecology perspective. *Parenting* 6, 1–48. doi: 10.1207/s15327922par0601_1

Serpell, Z. N., and Mashburn, A. J. (2012). Family school connectedness and children's early social development. *Soc. Dev.* 21, 21–46. doi: 10.1111/j.1467-9507.2011.00623.x

Sizer, T. R. (1992). *Horace's School: Redesigning the American High School*. Boston: Houghton Mifflin press.

Smetana, J. G., Metzger, A., and Campione-Barr, N. (2004). African American late adolescents' relationships with parents: developmental transitions and longitudinal patterns. *Child Dev.* 75, 932–947. doi: 10.1111/j.1467-8624.2004.00715.x

Steinberg, L., and Silk, J. S. (2002). "Parenting adolescents," in *Handbook of Parenting Volume 1: Children and Parenting*, (2nd Edn), ed. M. H. Bornstein (Mahwah, NJ: Lawrence Erlbaum Associates, Publishers), 103–134.

Stormont, M., Herman, K. C., Reinke, W. M., David, K. B., and Goel, N. (2013). Latent profile analysis of teacher perceptions of parent contact and comfort. *Sch. Psychol. Q.* 28, 195–209. doi: 10.1037/spq0000004

Tao, C. M. (2016). Study on the problems and solutions of communication between head teacher and parents. *Survey Educ.* 5, 58–59.

Todd, P. E., and Wolpin, K. I. (2007). The production of cognitive achievement in children: Home, school, and racial test score gaps. *J. Hum. Cap.* 1, 91–136. doi: 10.1086/526401

Tong, X. (2017). Extracurricular tutoring for middle school students: Family influencing factors and policy responses. *J. Educ. Res.* 9, 27–31.

Waller, W. W. (1932). *The Sociology of Teaching*. Hoboken, NJ: John Wiley & Sons Inc. doi: 10.1037/11443-000

Wei, Y., and Ma, X. (2017). A study on influencing factors of self-education expectation of middle school students: An empirical analysis based on CEPS. *Educ. Res. Monthly* 10, 69–78.

Wen, F. X. (2009). *The principle and application of hierarchical linear model*. Beijing: China Light Industry Press.

Wu, C. H., Zhang, J., and Wang, M. W. (2017). What prevents parents from involving in their children's education: Social class differences, school discrimination and parent involvement. *Educ. Res.* 1, 85–94.

Wu, Y. L. (2016). Research on the influence factors of the middle school students' after-school tutoring: Evidence from CEPS. *Educ. Sci.* 32, 63–73.

Xiong, Y. (2007). Study on the construction of good relationship between teachers and parents in China. *J. Inner Mongolia Normal Univer.* 20, 144–147.

Yang, J. (2006). Study on the current situation of the home-school cooperation. *J. Manag. Educ.* 26, 29–31.

Yang, X., and Liu, C. (2012). International experience and local development of home school cooperation. *Ideological Theoretical Educ.* 22, 7–11.

Yuan, Y., Chen, G., and Liu, W. (2019). The influence of parent-teacher relationship on junior middle school students' academic achievement. *Educ. Res. Experiment* 37, 61–67.

Zhang, G. L. (2013). The study on the large class quota in urban schools. *J. Liaoning Univer.* 36, 228–231.

Zhang, L. (2016). Secondary school students' interpersonal relationship and its impact on students' academic achievement:An empirical study based on China Education Panel Survey. *J. Educ. Stud.* 12, 98–103.

Zhang, L. N. (2018). A study on the mechanism of urban disadvantaged families' involvement in parent-school cooperation. *Jiangsu Educ. Res.* 1, 26–30.

Zhang, W. J. (2011). Review on home-school cooperation in the past twenty years in China. *Forum Contemp. Educ.* 4, 38–40.

Zhang, Z. S. (2003). Study on parents' satisfaction with primary schools. *Shanghai Res. Educ.* 3, 8–11.

Zhao, G., Ye, J., Li, Z., and Xue, S. (2017). How and why do Chinese urban students outperform their rural counterparts? *China Econ. Rev.* 45, 103–123.

Zhao, Y. D., and Hong, Y. B. (2012). Social capital in educational attainment: The perspectives of network resource and social closure. *Sociol. Stud.* 5, 47–68.

Zhou, F. S., and Xian, F. L. (2012). The analysis and thinking of school size change in compulsory education: Taking the Ningxia Autonomous Region as an example. *J. Educ. Stud.* 3, 46–53.

Zhu, S. P., and Gao, D. S. (2014). Investigation and reflections on teachers' ethics: A case study on four junior middle schools in Jiangsu province. *Global Educ.* 43, 51–59.

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Machiavellianism and learning-related subjective well-being among Chinese senior high school students: A moderated mediation model

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Based on the life history theory and broadening construction theory, the study aimed to investigate the influence of Machiavellianism on the learning-related subjective well-being and the underlying mechanism, 582 Chinese senior high school students (16.8±0.9years old) including 289 girls (48.3%) and 310 boys were recruited to participate in this study, and they anonymously filled out questionnaires regarding Machiavellianism, learning-related subjective well-being, gratitude, and subjective family economic level. The results showed that: (1) a higher level of Machiavellianism was associated with a lower level of learning-related subjective well-being; (2) gratitude partially mediated the relationship between Machiavellianism and learning-related subjective well-being; (3) subjective family economic level moderated the links between Machiavellianism and learning-related subjective well-being, and between gratitude and learning-related subjective well-being. This study explained how and when Machiavellianism affected Chinese senior high school students' learning-related subjective well-being and provided a deeper understanding of the relationship between Machiavellianism and learning-related subjective well-being.

KEYWORDS

Machiavellianism, learning subjective well-being, gratitude, subjective family economic level, senior high school students

Introduction

Subjective well-being (SWB), including happiness, life satisfaction, and positive affect (Diener, 2009), is defined that people making an evaluation of the general quality of life-based on their own standards (Suh et al., 1996), reflecting the individual adaptive status and cognitive evaluation to the social environment (Andrews and McKennell, 1980). Learning-related subjective well-being is the embodiment of subjective well-being in the learning process. Specifically, it refers to a sense of satisfaction, achievement, and pleasure

that students make comprehensive evaluations of learning based on personal standards in the three evaluation stages of pre-learning, during learning, and after learning (Gan, 2010). In China, students, especially senior high school students, are experiencing huge pressure to get higher education. The heavy academic burden and high expectations from the parents make students experience anxiety, loneliness, and depression (Liao, 2013; Shi et al., 2013; Li and Zhang, 2014; Peng et al., 2021), which leads to serious consequences such as suicide (Li, 2020; Shen et al., 2021; Zhang et al., 2021). Therefore, the learning-related subjective well-being of senior high school students should be taken seriously. Additionally, in July 2021, the Chinese Ministry of Education released the "Double Reduction Policy," which is committed to reducing students' burden, relieving students' pressure, and promoting the healthy growth of students. This also makes the research on the learning-related subjective well-being of high school students urgent.

Machiavellianism is often used to describe individuals who manipulate and exploit others for their purposes (Geng et al., 2015). It is characterized by a cynical view of human nature, a belief in the effectiveness of manipulative tactics in social interaction, and a moral outlook that puts self-interest above principle (Christie and Geis, 1970; Rauthmann, 2011; Cohen, 2016). The relationship between the Dark Triad Traits (i.e., Machiavellianism, psychopathy, and narcissism) and well-being has been well-documented (Aghababaei and Błachnio, 2015; Ma et al., 2021; Van Groningen et al., 2021). For example, Joshanloo (2021) and Rehman et al. (2018) found that Machiavellianism was negatively associated with well-being. And Machiavellianism is not only positively correlated with depression and perfectionism (Sherry et al., 2006; Bianchi and Mirkovic, 2020), but also negatively affects individuals' life satisfaction, subjective well-being (Sherry et al., 2006), and motivation for happiness (Cai et al., 2017). There is also an empirical study indicating that among all five empirically derived Dark Triad profiles, students with the low Machiavellianism profile exhibited the highest probability of "flourishing" (Hu and Lan, 2022). Furthermore, according to life history theory (LHT; Figueredo et al., 2006), which is a mid-level theory from evolutionary biology, individuals must make a balance between survival efforts and reproduction efforts to adapt to the environment. Specifically, if energy and resources are allocated to survival, individuals will pay attention to maintaining their bodies, developing knowledge and skills, raising offspring, and having long-term plans. On the contrary, if the energy and resources are allocated to reproduction, the individual tends to show precocious puberty, have more children and less investment in raising their generations, and have a preference for immediate satisfaction and short-term benefits (McDonald et al., 2012; Yang et al., 2022). The former can be called "slow life history strategy," while the latter can be called "fast life history strategy" (Jonason et al., 2015). These two strategies constitute the two poles of the life history strategy continuum. The individuals' balancing results determine their position in the continuum and lead to the formation of corresponding personality traits. As an executive agency, the personality traits coordinate behavior and environment to work together to complete adaptation tasks (Geng et al., 2014; Birkás et al., 2020). Both the fast life history strategy and the slow life history strategy have adaptive significance, but individuals holding the fast life history strategy solve their adaptation problems at the cost of physical and mental health and quality of life. Studies showed that Machiavellianism is one of the indicators of the fast life history strategy (Crysel et al., 2013; Jonason et al., 2015). Thus we hypothesized that Machiavellianism would be negatively correlated with learning-related subjective well-being (H1).

Gratitude is one of the most important virtues developed by human beings in the process of evolution and is defined as the emotional experience or state of mind that an individual produces when he receives a certain kind of favor (Zhang and Hou, 2010). According to the broadening construction theory of gratitude (Fredrickson and Joiner, 2002), gratitude has the function of inducing positive emotion. Previous studies have shown that gratitude is a valid predictor of happiness, stress perception, and depression (Xie et al., 2013; He et al., 2015). According to the positive emotion expansion construction theory proposed by Fredrickson, gratitude could help individuals to expand cognitive schemas, enhance thinking flexibility, organize social capital, and eliminate the negative effects caused by negative emotions (Fredrickson and Joiner, 2002). And the achievement motivation theory (Anderman, 2020) points out that gratitude can enhance the motivation for goal pursuit, promote teenagers' academic participation, and then improve their happiness. Researchers have found that individuals with a higher level of gratitude have a higher quality of mental health (Deng et al., 2016; Ding and Zhao, 2018; Li and Zhou, 2018). Many empirical studies have demonstrated that trait gratitude is positively related to SWB (Froh et al., 2008; Wood et al., 2010; Alkozei et al., 2018; Chopik et al., 2019). For instance, a longitudinal study found that trait gratitude could predict the positive aspects of SWB (i.e., life satisfaction and positive affect) in Chinese adolescents (Yang et al., 2021). Some studies have also found that the higher the level of individual gratitude, the easier it is to obtain social support in the face of difficulties, which can improve their subjective well-being (Luo and Zhou, 2015). Given that, we speculated that the level of gratitude of students could be positively correlated with learning-related subjective well-being (H2).

According to the implicit gratitude theory, gratitude is an unconscious or automatic emotional response, which attempts to return kindness to others based on acknowledging the kindness or help from the benefactors (He et al., 2013). Whereas Machiavellianism can hinder individuals from experiencing the feeling of gratitude and further trigger their exploitative behavior (Arathy et al., 2021). In addition, in terms of moral and psychological judgment, Machiavellians do not feel favored by others, so it is difficult to translate into gratitude practice (Qin, 2013). Given the findings outlined above, we predicted that gratitude could mediate the relationship between Machiavellianism and learning-related subjective well-being (H3).

Subjective well-being is not an ungrounded subjective feeling, it is affected by economic conditions (Hou et al., 2009; Yao et al., 2015). Researchers have found that family economic level and income status could directly affect the subjective well-being of individuals (Yang et al., 2015). In addition, researchers also demonstrated that economic status moderated the effects of the predictive factors on subjective well-being. For example, income plays a moderating role in the relationship between job satisfaction and subjective well-being in urban China (Nielsen et al., 2011) and between social relationships and subjective well-being (Mullen et al., 1989). A meta-analysis has indicated that subjective well-being has a stronger link to socioeconomic status measured subjectively as relative rank than measured objectively as income or educational attainment (Tan et al., 2020). Studies have revealed that family subjective socioeconomic status is a strong and positive factor that contributes to well-being, demonstrating that individuals with higher family subjective socioeconomic status exhibited greater well-being (Navarro-Carrillo et al., 2020; Yan et al., 2022). Thus, we predicted that subjective family economic level could moderate the links between learning-related subjective well-being and Machiavellianism and gratitude (H4).

Taken together, the current study aimed to explore the relationship between Machiavellianism and learning-related subjective well-being among Chinese senior high school students and to investigate the mediating effect of gratitude and the moderating effect of subjective family economic level as well.

Materials and methods

Participants

The final data was collected from 582 (the sample size would provide sufficient power according to justifications for the sample size in a study (Daniël, 2022) and the priori sample size ($n = 105$) calculation conducted *via* Gpower [effect size was set at 0.2 (medium), $\alpha = 0.5$, $\beta = 0.95$)] senior high school students in Henan, China in September 2021. The participants, with a mean age of 16.8 (SD = 0.9) years, included 289 girls (48.3%) and 310 boys (51.7%). Among these participants, 347 were from Grade 12, 176 from Grade 11, and 72 from Grade 10. The study was approved by the Ethics Committee of the institution and carried out following the approved guidelines and regulations. The written informed assent was obtained from the participants and the written informed consent was obtained from the student's guardians. And all participants were paid for their participation.

Measures

Machiavellianism was measured with the self-report and validated Chinese version of Kiddie Machiavellian Scale revised by Geng et al. (2011). The scale is composed of 16 items that assess distrust (five items; e.g., "*Sometimes you have to hurt others in order to get what you want*"), distrust of humanity (seven items; e.g., "*Do not tell anyone the real reason for doing something unless you have a special purpose*"), and dishonest (four items; e.g., "*The best way to interact with someone is to say what they want to know*."). Participants answered on a 4-point Likert scale, ranging from 0 (total agreement) to 3 (total disagreement). The higher scores indicated lower levels of Machiavellianism. In this study, Cronbach's α coefficient is 0.71.

The learning-related subjective well-being was evaluated with the Learning-related Subjective Well-being Questionnaire developed by Ma and Liu (2005). The questionnaire is consisted of 18 items, including learning achievement (six items; e.g., "*I can study with high energy*"), positive learning experience (four items; e.g., "*I can often achieve my goals*"), learning values (four items; e.g., "*I am so bad at learning that I want to give up*"), and negative experiences of learning (four items; e.g., "*I feel empty lately and do not know what to do*"). Each item was rated on a 5-point Likert scale (1 = "*not at all*," 5 = "*completely*"). The score for each factor is generated by adding the scores of items within that factor. The Cronbach's alpha coefficient for the total scale was 0.850, and the Cronbach's alpha coefficients were 0.807 for academic achievement, 0.830 for the positive learning experience, 0.720 for learning value, and 0.722 for a negative learning experience.

Gratitude was measured with the Chinese version of the Gratitude Questionnaire (GQ-6; Wei et al., 2011), which contains six items, such as "*There are so many things in life for which I feel grateful.*" Each item was rated on a 7-point Likert scale (1 = "*strongly disagree*," 5 = "*strongly agree*"). The total score is generated by adding the scores of all the items, with higher scores indicating higher levels of gratitude. In this study, Cronbach's alpha coefficient for this questionnaire was 0.854.

The subjective family economic level was evaluated with the question "*How do you think about the economic level of your family?*," which was adapted from the item "Family Economic Status" in the Postgraduate Stress Questionnaire (Yu and Zheng, 2005). Answers were recorded on a 5-point scale (1 = "*poor*," 5 = "*rich*") with higher scores indicating a higher subjective family economic level. When an item clears the conceptual ambiguity and reflects the common of one concept to participants' daily experiences, single-item measures can be appropriated (Wanous and Reichers, 1996; Wanous et al., 1997; Cureu et al., 2021). And we had explained the meaning of economy in the item description, so we hope we could obtain an accurate indicator of this variable.

Data analysis

Pearson correlation analysis was used to study the correlation of the variables (Machiavellianism, gratitude, household economic level). Mediated and chained mediator models were analyzed using the PROCESS macro in SPSS, with 95% confidence intervals that do not contain zero indicating a significant mediating effect. To determine whether the indirect or total effects were statistically significant, we used maximum likelihood estimates and

bias-corrected bootstrap 95% confidence intervals based on 5,000 bootstraps and employed Model 15 to investigate the moderated mediation effects.

Results

Common method bias test

The Harman one-way test was used to test for common method bias (Podsakoff et al., 2003). The results showed that a total of 12 factors had characteristic roots greater than one and the variance explained by the first factor was 20.62%, which was less than 40%, indicating that there was no severe common method bias in this study.

Preliminary analyses

Means, standard deviations, and correlations for all variables were presented in Table 1. Pearson's correlation analysis results showed that learning-related subjective well-being was significantly and positively correlated with levels of gratitude, but negatively correlated with the level of Machiavellianism which was negatively correlated with gratitude, but positively associated with subjective family economic level.

Mediating role of gratitude

First, this study used Model 4 in the PROCESS program developed by Hayes (2017) to test the mediating effect of gratitude in the association between Machiavellianism and learning-related subjective well-being. A mediation model with learning-related subjective well-being as the dependent variable, Machiavellianism as the independent variable, and gratitude as the mediating variable was conducted using Bootstrap's method. The results showed the indirect effect was 0.10 with a 95% confidence interval of [0.065, 0.154], which does not contain 0, indicating a significant indirect effect of gratitude, which demonstrates the mediating role of gratitude. Besides, the direct effect of Machiavellianism on learning-related subjective well-being was 0.21 with a 95% confidence interval of [0.135, 0.288], not containing 0, which indicated that the direct effect of Machiavellianism was also significant, gratitude played a partial mediating role in the association between Machiavellianism and learning subjective well-being (Table 2).

Moderating role of subjective family economic level

Using PROCESS 15, all variables were standardized and the equation model was shown in Table 3. The results showed the Machiavellianism was significantly predictive of subjective well-being of learning ($\beta = 0.32$, $p < 0.001$) and gratitude ($\beta = 0.20$, $p < 0.001$), gratitude was a positive predictor of learning-related subjective well-being ($\beta = 0.32$, $p < 0.001$), family economic level and Machiavellianism interaction term was a negative predictor of learning-related subjective well-being ($\beta = -0.18$, $p < 0.01$), and family economic level and gratitude interaction term positively predicted learning-related subjective well-being ($\beta = 0.14$, $p < 0.05$; Figure 1).

To further reveal how subjective family economic level moderated the effects of Machiavellianism and gratitude on the learning-related subjective well-being, the mean score of subjective family economic level plus or minus one standard deviation was divided into two groups of high and low subjective family economic level and the moderating effects were plotted. As shown in Figure 2, subjective family economic level positively moderated the relationship between gratitude and learning-related subjective well-being. Specifically, the predictive effect of

TABLE 1 Descriptive statistics and correlations of the study variables.

	M ± SD	1	2	3	4	5	6	7	8	9	10	11
1 Learning-related subjective well-being	58.4 ± 12.5	1										
2 Academic achievement	15.4 ± 5.3	0.79**	1									
3 Positive experience of learning	12.9 ± 4.0	0.86**	0.53**	1								
4 A sense of the value of learning	16.4 ± 3.4	0.71**	0.32**	0.59**	1							
5 Negative experience of learning	13.8 ± 3.4	0.73**	0.41**	0.59**	0.37**	1						
6 Machiavellianism	52.3 ± 6.7	0.33**	0.21**	0.28**	0.28**	0.30**	1					
7 Distrust	13.3 ± 3.8	0.19**	0.08*	0.18**	0.21**	0.19**	0.75**	1				
8 Lack of faith in humanity	26.2 ± 3.5	0.34**	0.25**	0.28**	0.24**	0.28**	0.75**	0.22**	1			
9 Dishonesty	13.0 ± 2.0	0.14**	0.11**	0.10**	0.12**	0.13**	0.59**	0.19**	0.34**	1		
10 Gratitude	34.0 ± 7.1	0.39**	0.23**	0.32**	0.41**	0.27**	0.34**	0.23**	0.38**	0.05	1	
11 Subjective family economic level	3.2 ± 1.7	−0.05	−0.05	−0.03	−0.06	−0.03	−0.10*	−0.07	−0.08*	−0.06	−0.07	1

*$p < 0.05$. and **$p < 0.01$.

gratitude on learning-related subjective well-being was stronger among students with high subjective family economic level [$\beta_{simple} = 0.15$, 95% CI (0.062, 0.240)] than among students with low subjective family economic level [$\beta_{simple} = 0.058$, 95% CI (0.008, 0.130)], which indicated higher subjective family economic level enhanced the positive effect of gratitude on learning-related subjective well-being.

As shown in Figure 3, subjective family economic level, however, negatively moderated the relationship between Machiavellianism and learning-related subjective well-being. Specifically, the negative predictive effect of Machiavellianism on learning-related subjective well-being was stronger among students with high subjective family economic level [$\beta_{simple} = 0.40$, 95% CI (0.247, 0.554)] than among the students with low subjective family economic level [$\beta_{simple} = -0.01$, 95% CI (−0.167, 0.154)], which indicated higher subjective family economic level buffered the negative effect of Machiavellianism on the learning-related subjective well-being.

Discussion

The current study explored the relationship between Machiavellianism and learning-related subjective well-being of Chinese senior high school students, the mediating role of gratitude, and the moderating role of subjective family economic level, which was helpful to understand the psychological mechanism for the formulation of learning-related subjective well-being and had implications for enhancement of the learning-related subjective well-being of senior high school students. Consistent with the hypotheses, the results showed that the higher level of Machiavellianism was associated with the lower learning-related subjective well-being of senior high school students, gratitude played a partial mediating role between Machiavellianism and learning-related subjective well-being, and subjective family economic level moderated the effect of Machiavellianism and gratitude on learning-related subjective well-being.

The results of the current study showed that Machiavellianism was significantly negatively correlated with high school students' learning-related subjective well-being, which was essentially consistent with previous studies. For example, Machiavellianism has a negative effect on teenagers' motivation for happiness and well-being (Cai et al., 2017). Besides, the result also supported the life history theory (LHT), individuals holding the fast life history strategy with Machiavellianism being one of the indicators (Crysel et al., 2013; Jonason et al., 2015) tend to solve their adaptation problems at the cost of physical and mental health and quality of life. In the present study, to solve their adaptation problems, students high in Machiavellianism, who lack trust in others and have a higher level of interpersonal exclusion (He et al., 2018; Bloxsom et al., 2021), exploit others for short-term benefits and are difficult to obtain stable social support (Bloxsom et al., 2021). If things go on like this, although it helps to fulfill the short-term learning tasks, it will affect their learning motivation (Song et al., 2010), and reduce their positive learning experience (Kämmerle et al., 2014). Therefore, the higher the level of Machiavellianism of senior high school students, the lower their learning-related subjective well-being.

The current result also showed that gratitude had a positive impact on teenagers' learning-related subjective well-being, which was consistent with a previous study showing that once gratitude is induced, individuals will have a sense of high learning efficacy and academic achievement (Hou, 2018). In addition, after experiencing negative events, individuals can maintain

TABLE 2 The direct effect and indirect effect in the mediating model.

	Effect	Boot SE	Boot CI lower 95%	Boot CI upper 95%	Relative effect values
Direct effect	0.21**	0.039	0.1348	0.2876	66.35%
Indirect effect	0.10**	0.022	0.0651	0.1539	33.65%
Overall effect	0.31**	0.0386	0.2424	0.3941	

**$p < 0.01$.

TABLE 3 Test the moderated mediation effect.

	Learning-related subjective well-being			Gratitude			Learning-related subjective well-being		
	β	*SE*	*t*	*β*	*SE*	*t*	*β*	*SE*	*t*
Machiavellianism	0.32	0.84	8.56***	0.21	0.04	5.43***	0.20	0.04	5.25***
Gratitude				0.33	0.04	8.07***	0.32	0.04	7.63***
Subjective family economic level							−0.17	0.07	−2.49**
Subjective family economic level*Machiavellianism							−0.18	0.06	−2.95**
Subjective family economic level* Gratitude							0.14	0.07	2.00*
R^2		0.12		0.20				0.22	
F		72.51***		70.40***				30.68***	

*$p < 0.05$, **$p < 0.01$ and ***$p<0.001$.

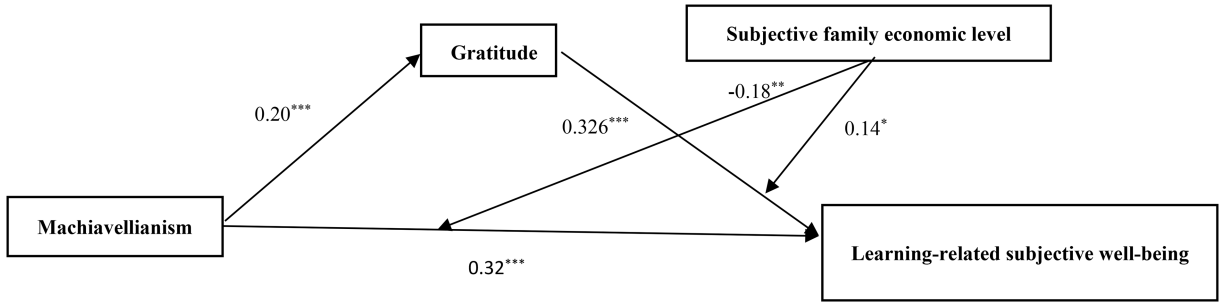

FIGURE 1
The mediating model for Machiavellianism and learning-related subjective well-being. *p <0.05, **p <0.01 and ***p <0.001.

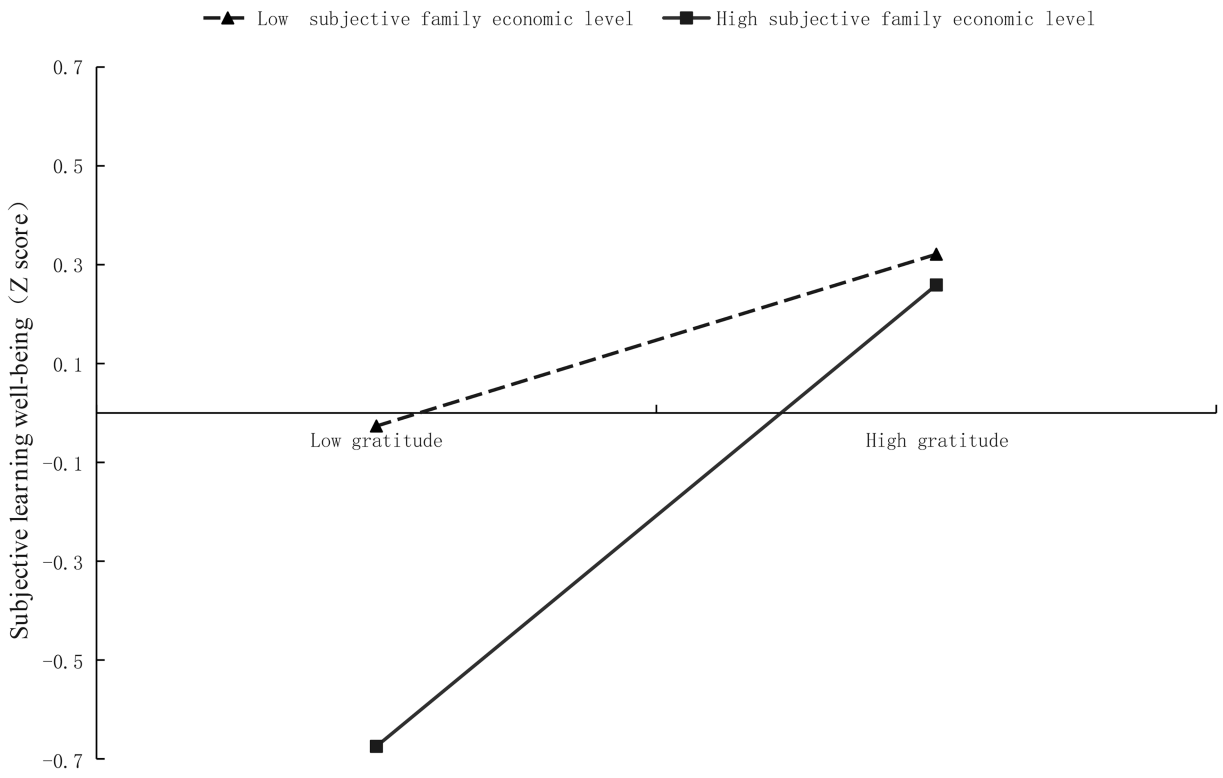

FIGURE 2
The interaction effect of subjective family economic level and gratitude on learning-related subjective well-being.

psychological balance through gratitude and eliminate the negative effects caused by negative emotions (Yang and Ye, 2014; Asici and Sari, 2021). The present study also showed that gratitude played a partial mediating role in the relationship between Machiavellianism and learning-related subjective well-being. Implicit gratitude theory goes that gratitude is an unconscious or automatic emotional response, which attempts to return kindness to others based on acknowledging the kindness or help from the benefactors (He et al., 2013). However, the personality traits of low empathy, such as Machiavellianism, are difficult to allow individuals to have positive feelings and empathy for the outside world (Aghababaei et al., 2018). Another study indicates that when encountering negative events in the learning process, individuals high in Machiavellianism could recognize less positive emotions and experience lower social support (Cheng and Li, 2010). Therefore, senior high school students with a high level of Machiavellianism have a lower level of gratitude, leading to lower learning-related subjective well-being.

The results of this study showed that subjective family economic level positively moderated the relationship between gratitude and learning-related subjective well-being, and negatively moderated the relationship between Machiavellianism

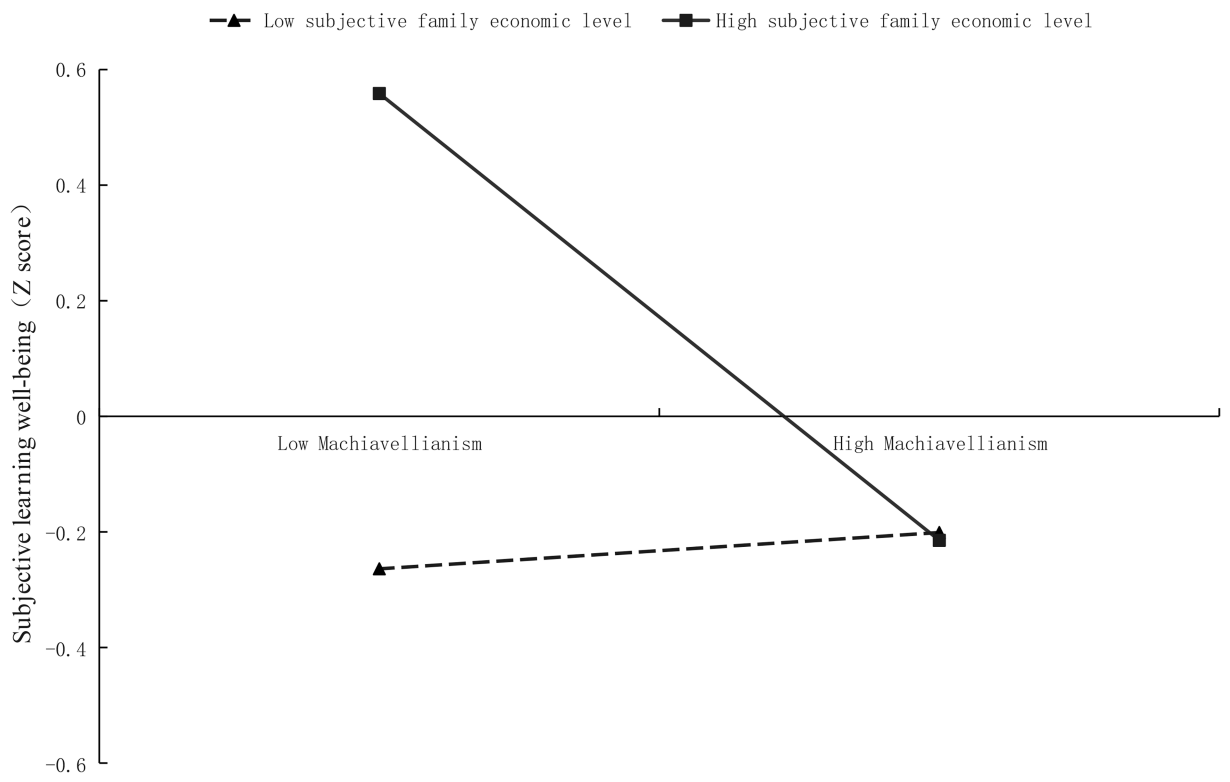

FIGURE 3
The interaction effect of subjective family economic level and Machiavellianism on learning-related subjective well-being.

and learning-related subjective well-being. Specifically, a higher subjective family economic level could enhance the positive effect of gratitude on the level of learning-related subjective well-being, and could also boaster the negative impact of Machiavellianism on the level of learning-related subjective well-being, but the lower subjective economic level weakened the associations between learning-related subjective well-being and Machiavellianism and gratitude. The results may be interpreted by LHT, that is, students from lower economic status are not so sensitive either to Machiavellianism or gratitude in shaping their well-being.

The result that the higher subjective economic level made learning-related subjective well-being more negatively associated with Machiavellianism, but more positively with gratitude, supported the resource amplification or "Matthew effect" hypothesis which holds that structural characteristics such as a higher socioeconomic status (SES, income is one important indicator of SES; Duncan et al., 2017) and individual characteristics coalesce in producing life outcomes (Walberg and Tsai, 1983) and were consistent with prior studies showing that the relationships between Conscientiousness and academic achievement were higher in higher- vs. lower-SES students (Brandt et al., 2020; Lechner et al., 2021).

Besides, individuals with high extraversion/positive emotionality/approach behavior which are closely associated with extraversion, are particularly sensitive to positive emotions and rewarding stimuli, whereas individuals with high neuroticism/negative emotionality/avoidance behavior which are closely associated with neuroticism, are particularly sensitive to negative emotions and stressful conditions (Watson and Clark, 1992; Watson et al., 1999; Canli et al., 2002; Canli, 2004). And Machiavellianism was positively correlated with neuroticism, and negatively with agreeableness, conscientiousness, and openness (Muris et al., 2013), which reflects negative emotionality and is sensitive to negative stimuli, whereas gratitude is positively associated with extraversion, and negatively correlated with neuroticism (McCullough et al., 2001), which reflects positive emotionality and is sensitive to positive stimuli. Thus learning-related subjective well-being could be negatively associated with Machiavellianism, but positively associated with gratitude even among the population from families with higher subjective economic levels.

What's more, money has been called a "flexible and broadly useful coping resource" (McGonagle & Kessler, 1990, p. 697). Higher SES confers psychological advantages, such as higher levels of self-efficacy and coping abilities (Lorant et al., 2003). And a high SES is an important factor that could preserve reserve capacities and mitigate the progression of functional limitation (House et al., 2005; Singh-Manoux et al., 2005). According to the Family investment model (Conger and Donnellan, 2007), families with higher SES can provide a good educational and living

environment and high-quality educational opportunities. Thus higher economic level could facilitate students with gratitude to benefit more regarding the learning-related subjective well-being.

Having higher economic level is not always a panacea, empirical studies showed that there was a negative relationship between the Dark Triad traits (Machiavellianism, psychopathy, and narcissism) and intellectual humility, and this relationship was stronger for privately schooled students, because high-SES individuals tend to be greedier, more unempathic and motivated by personal goals (Manstead, 2018), and are often overconfident and overestimate their ability more than others (Belmi et al., 2020). Besides, high subjective SES may also operate to exacerbate a sense of vulnerability (Wang and Liu, 2021). One study demonstrated that individuals with high subjective status showed significant cortisol increases when faced with social-evaluative threats (Gruenewald et al., 2006). According to the General Strain Theory (Agnew, 1992), individuals exposed to strains and stressors could develop negative emotions. Youth from higher SES backgrounds may experience additional stressors due to parental expectations and pressures to achieve as well as isolation or lack of parental involvement (Luthar and Latendresse, 2005). For example, individuals with high SES may worry that they fail to achieve goals valued by their family members (e.g., obtaining a university degree), and they may also be particularly likely to engage in conflicts with their family members (e.g., parents may have different values and feel disappointed), whereas, lower SES young people are more likely to have lower career self-efficacy and set lower educational and career aspirations (Thompson, 2013), and teachers have been shown to harbor lower expectations of less advantaged students (Tenenbaum and Ruck, 2007). What's more, Machiavellians are well known to view others in a goal-oriented manner and tend to behave manipulatively to exploit others; that is, they see people 'as a means to an end' (Christie and Geis, 1970; Yang et al., 2019), Specifically, they give less importance to relationships, are ready to manipulate these for personal gains, have less trust on others, thus having more negative feelings from relationships (Gondal et al., 2020). That is to say, individuals higher in Machiavellianism may not only get pressure from their parents due to the higher economic level but also have negative emotions from the bad relationship among peers due to manipulative behaviors, thus the higher subjective economic level could exacerbate the negative association between Machiavellianism and learning-related subjective well-being.

There are some limitations of the current study that should be considered. Firstly, only self-report measures were used, and therefore the present study may be subject to mono-informant biases. Future research can combine multiple methods (such as simultaneously collecting data from the participant's family members, teachers, and peers) and evidence from multiple indicators (such as behavioral studies, EEG, etc.) for further research. Secondly, the cross-sectional study design limits causal inferences, which is accompanied by a conceptual issue with the mediation model. That is, whether Machiavellianism or learning-related subjective well-being is the dependent variable is an arbitrary choice since Machiavellianism could also be the consequence of diminished learning-related subjective well-being based on the life history theory. Thus a longitudinal research design to investigate the causal relationship between the two variables is needed. Finally, this study only sampled high school students, which limits the generalizability of the results to the population. Future research should consider a more diverse population, such as primary school students and junior high school students.

Conclusion

The results of this study revealed the effects of Machiavellianism on the Chinese senior high school students' learning-related subjective well-being and the underlying mechanism: (1) The higher the level of Machiavellianism, the lower the learning-related subjective well-being of Chinese senior high school students; (2) Machiavellianism is not only directly associated with learning-related subjective well-being, but also indirectly associated with learning-related subjective well-being *via* the level of gratitude; (3) A higher subjective family economic level can enhance the positive effect of gratitude on the level of learning-related subjective well-being, but also could exacerbate the negative impact of Machiavellianism on the level of learning-related subjective well-being.

The current findings have important implications for improving senior high school students' learning-related subjective well-being. First of all, Machiavellianism could have a direct and indirect effect *via* gratitude on learning-related subjective well-being, suggesting that the preventions and interventions for lowering the level of Machiavellianism and enhancing gratitude could both help to improve high school students' learning-related subjective well-being. Secondly, the present findings suggest that a higher subjective family economic level could enhance the positive effects of gratitude, but boast the negative effects of Machiavellianism, on the learning-related subjective well-being, suggesting that a higher subjective family economic level could represent a "double-edged" sword, interventions for shaping the concept of money should take the gratitude and Machiavellianism into considerations. Finally, the moderated mediation model of this study suggests that learning-related subjective well-being is jointly influenced by Machiavellianism, subjective family economic level, and gratitude. These aspects should be taken into consideration to achieve the best intervention effect and ultimately improve the senior high school students' learning-related subjective well-being, which could help in the implementation of the "Double Reduction Policy."

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving human participants were reviewed and approved by the Research Ethical Committee in Zhengzhou University (Reference Number: 305). Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin.

Author contributions

MY: research design and protocol and raw manuscript. CQ: research protocol and data analysis. HG, XG, and KT: data collection and analysis. GW: research design and manuscript revisions and corrections. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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References

Aghababaei, N., and Błachnio, A. (2015). Well-being and the dark triad. *Personal. Individ. Differ.* 86, 365–368. doi: 10.1016/j.paid.2015.06.043

Aghababaei, N., Błachnio, A., and Aminikhoo, M. (2018). The relations of gratitude to religiosity, well-being, and personality. *Mental Health Relig. Cult.* 21, 408–417. doi: 10.1080/13674676.2018.1504904

Agnew, R. (1992). Foundation for a general strain theory of crime and delinquency. *Criminology* 30, 47–88. doi: 10.1111/j.1745-9125.1992.tb01093.x

Alkozei, A., Smith, R., and Killgore, W. D. (2018). Gratitude and subjective wellbeing: a proposal of two causal frameworks. *J. Happiness Stud.* 19, 1519–1542. doi: 10.1007/s10902-017-9870-1

Anderman, E. M. (2020). Achievement motivation theory: balancing precision and utility. *Contemp. Educ. Psychol.* 61:101864. doi: 10.1016/j.cedpsych.2020.101864

Andrews, F. M., and McKennell, A. C. (1980). Measures of self-reported well-being: their affective, cognitive, and other components. *Soc. Indic. Res.* 8, 127–155. doi: 10.1007/BF00286474

Arathy, P., Sampada, K., Hansika, K., and Aneree, P. (2021). Gratitude blindness: How does the Dark Triad experience gratitude?. *Pers. Individ. Differ.* doi: 10.1016/j.paid.2020.110309

Asici, E., and Sari, H. I. (2021). A proposed model to explain happiness in college students: the roles of perceived parenting styles, emotional self-efficacy, and forgiveness. *J. Adult Dev.* 28, 332–345. doi: 10.1007/s10804-021-09378-0

Belmi, P., Neale, M. A., Reiff, D., and Ulfe, R. (2020). The social advantage of miscalibrated individuals: the relationship between social class and overconfidence and its implications for class-based inequality. *J. Pers. Soc. Psychol.* 118, 254–282. doi: 10.1037/pspi0000187

Bianchi, R., and Mirkovic, D. (2020). Is Machiavellianism associated with depression? A cluster-analytic study. *Personal. Individ. Differ.* 152:109594. doi: 10.1016/j.paid.2019.109594

Birkás, B., Pátkai, G., and Csathó, Á. (2020). The mediating role of the dark triad between life history strategy and perceived stress factors. *Psychol. Rep.* 123, 252–265. doi: 10.1177/0033294118818095

Bloxsom, C. A., Firth, J., Kibowski, F., Egan, V., Sumich, A. L., and Heym, N. (2021). Dark shadow of the self: how the dark triad and empathy impact parental and intimate adult attachment relationships in women. *Forensic Sci. Int. Mind Law* 2:100045. doi: 10.1016/j.fsiml.2021.100045

Brandt, N. D., Lechner, C. M., Tetzner, J., and Rammstedt, B. (2020). Personality, cognitive ability, and academic performance: differential associations across school subjects and school tracks. *J. Pers.* 88, 249–265. doi: 10.1111/jopy.12482

Cai, P., Zuo, S., Wang, F., Huang, N., and Xu, Y. (2017). The effect of the dark triad personality on Teenagers' orientations to happiness and subject well-being. *Chin. J. Spec. Educ.* 12, 60–67. doi: 10.3969/j.issn.1007-3728.2017.12.009

Canli, T. (2004). Functional brain mapping of extraversion and neuroticism: learning from individual differences in emotion processing. *J. Pers.* 72, 1105–1132. doi: 10.1111/j.1467-6494.2004.00292.x

Canli, T., Sivers, H., Whitfield, S. L., Gotlib, I. H., and Gabrieli, J. D. (2002). Amygdala response to happy faces as a function of extraversion. *Science* 296:2191. doi: 10.1126/science.1068749

Cheng, Q., and Li, X. (2010). Dissociation phenomena of implicit self-esteem and explicit self-esteem in Machiavellian individuals. *Chin. J. Health Psychol.* 18, 1344–1345. doi: 10.13342/j.cnki.cjhp.2010.11.035

Chopik, W. J., Newton, N. J., Ryan, L. H., Kashdan, T. B., and Jarden, A. J. (2019). Gratitude across the life span: age differences and links to subjective well-being. *J. Posit. Psychol.* 14, 292–302. doi: 10.1080/17439760.2017.1414296

Christie, R., and Geis, F. L. (1970). *Studies in Machiavellianism*. New York: Academic Press.

Cohen, A. (2016). Are they among us? A conceptual framework of the relationship between the dark triad personality and counterproductive work behaviors (CWBs). *Hum. Resour. Manag. Rev.* 26, 69–85. doi: 10.1016/j.hrmr.2015.07.003

Conger, R. D., and Donnellan, M. B. (2007). An interactionist perspective on the socioeconomic context of human development. *Annu. Rev. Psychol.* 58, 175–199. doi: 10.1146/annurev.psych.58.110405.085551

Crysel, L. C., Crosier, B. S., and Webster, G. D. (2013). The dark triad and risk behavior. *Personal. Individ. Differ.* 54, 35–40. doi: 10.1016/j.paid.2012.07.029

Cureu, P. L., Coman, A. D., Panchenko, A., Fodor, O. C., and Raiu, L. (2021). Death anxiety, death reflection and interpersonal communication as predictors of social distance towards people infected with covid-19. *Curr. Psychol.* 38, 1–14. doi: 10.1007/s12144-020-01171-8

Daniël, L. (2022). Sample size justification. Collabra. *Psychology* 8:33267. doi: 10.1525/collabra.33267

Deng, Y., Zhu, Y., Li, Y., and Liu, X. (2016). Effects of gratitude-based intervention on aggression and subjective well-being in violent criminals. *Chin. J. Clin. Psych.* 24, 368–372. doi: 10.16128/j.cnki.1005-3611.2016.02.042

Diener, E., and Ryan, K. (2009). Subjective Well-Being: A general overview. *S. Afr. J. Psychol.* 39, 391–406. doi: 10.1177/008124630903900402

Ding, F., and Zhao, H. (2018). Is the individual subjective well-being of gratitude stronger? A meta-analysis. *Adv. Psychol. Sci.* 26, 1749–1763. doi: 10.3724/SP.J.1042.2018.01749

Duncan, R. J., McClelland, M. M., and Acock, A. C. (2017). Relations between executive function, behavioral regulation, and achievement: moderation by family income. *J. Appl. Dev. Psychol.* 49, 21–30. doi: 10.1016/j.appdev.2017.01.004

Figueredo, A. J., Vásquez, G., Brumbach, B. H., Schneider, S. M., Sefcek, J. A., Tal, I. R., et al. (2006). Consilience and life history theory: from genes to brain to reproductive strategy. *Dev. Rev.* 26, 243–275. doi: 10.1016/j.dr.2006.02.002

Fredrickson, B. L., and Joiner, T. (2002). Positive emotions trigger upward spirals toward emotional well-being. *Psychol. Sci.* 13, 172–175. doi: 10.1111/1467-9280.00431

Froh, J. J., Yurkewicz, C., and Kashdan, T. B. (2008). Gratitude and subjective well-being in early adolescence: examining gender differences. *J. Adolesc.* 32, 633–650. doi: 10.1016/j.adolescence.2008.06.006

Gan, X. (2010). Compiling and primary applying of learning-related subjective well-being for junior high school students. *Chin. J. School Health* 31, 1190–1192. doi: 10.16835/j.cnki.1000-9817.2010.10.018

Geng, Y., Chang, G., Li, L., Sun, Q., and Huang, J. (2014). Review on the studies of Machiavellianism trait. *Chin. J. Clin. Psych.* 22, 816–820. doi: 10.16128/j.cnki.1005-3611.2014.05.058

Geng, Y., Qin, B., Xia, D., and Han, X. (2011). Relations between sophistication and prosocial behavior in adolescents. *Chin. J. School Health* 32, 44–46. doi: 10.16835/j.cnki.1000-9817.2011.01.021

Geng, Y., Sun, Q., Huang, J., Zhu, Y., and Han, X. (2015). Dirty dozen and short dark triad: a Chinese validation of two brief measures of the dark triad. *Chin. J. Clin. Psych.* 23, 246–250. doi: 10.16128/j.cnki.1005-3611.2015.02.013

Gondal, M. U., Makhdoom, I. F., and Malik, N. I. (2020). Moderating role of trust within the relationship between machiavellianism and marital Satisfaction. *FWU J. Soc. Sci.* 14, 28–36.

Gruenewald, T. L., Kemeny, M. E., and Aziz, N. (2006). Subjective social status moderates cortisol responses to social threat. *Brain Behav. Immun.* 20, 410–419. doi: 10.1016/j.bbi.2005.11.005

Hayes, A. F. (2017). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. New York: Guilford publications.

He, A., Hui, Q., and Liu, H. (2015). Relationship between social support and loneliness in undergraduates: the mediating role of gratitude. *Chin. J. Clin. Psych.* 23, 150–153. doi: 10.16128/j.cnki.1005-3611.2015.01.034

He, A. M., Liu, H. S., and Hui, Q. P. (2013). An experimental research on implicit and explicit gratitude of undergraduates. *Psychol. Dev. Educ.* 45, 22–30. doi: 10.16187/j.cnki.issn1001-4918.2013.01.011

He, Q., Wang, Y., Xing, Y., and Yu, Y. (2018). Dark personality, interpersonal rejection, and marital stability of Chinese couples: An actor–partner interdependence mediation model. *Pers. Individ. Differ.* 134, 232–238. doi: 10.1016/j.paid.2018.06.003

Hou, J. (2018). A follow-up study of the impact of achievement goal orientation on academic performance: the mediating effect of gratitude. *Chin. J. Spec. Educ.* 12, 69–74. doi: 10.3969/j.issn.1007-3728.2018.12.012

Hou, J., Zou, H., and Li, X. (2009). The characteristics of the family environment and its influence on the life satisfaction of migrant children. *Psychol. Dev. Educ.* 25, 78–85.

House, J. S., Lantz, P. M., and Herd, P. (2005). Continuity and change in the social stratification of aging and health over the life course: evidence from a nationally representative longitudinal study from 1986 to 2001/2002 (Americans'Changing lives study). *J. Gerontol Series B Psychol. Sci. Soc. Sci.* 60, S15–S26. doi: 10.1093/geronb/60.Special_Issue_2.S15

Hu, Y., and Lan, X. (2022). A comprehensive and person-centered view of the association between the dark triad and youth mental health. *Front. Psych.* 13:900354. doi: 10.3389/fpsyt.2022.900354

Jonason, P. K., Duineveld, J. J., and Middleton, J. P. (2015). Pathology, pseudopathology, and the dark triad of personality. *Personal. Individ. Differ.* 78, 43–47. doi: 10.1016/j.paid.2015.01.028

Joshanloo, M. (2021). Conceptions of happiness mediate the relationship between the dark triad and well-being. *Front. Psychol.* 12:643351. doi: 10.3389/fpsyg.2021.643351

Kämmerle, M., Unterrainer, H. F., Dahmen-Wassenberg, P., Fink, A., and Kapfhammer, H. P. (2014). Dimensions of religious/spiritual well-being and the dark triad of personality. *Psychopathology* 47, 297–302. doi: 10.1159/000358563

Lechner, C. M., Bender, J., Brandt, N. D., and Rammstedt, B. (2021). Two forms of social inequality in Students' socio-emotional skills: do the levels of big five personality traits and their associations with academic achievement depend on parental socioeconomic status? *Front. Psychol.* 12:679438. doi: 10.3389/fpsyg.2021.679438

Li, Y. (2020). Prevalence of suicidal behaviors among primary and middle school students and its relationship with academic burden in Henan Province. Chinese. *J. Sch. Health* 41, 539–542. doi: 10.16835/j.cnki.1000-9817.2020.04.016

Li, H., and Zhang, W. (2014). Peer support: easing up the relationship between Adolescents' learning pressure and depression. *Chin. J. Spec. Educ.* 10, 87–91. doi: 10.3969/j.issn.1007-3728.2014.10.015

Li, Z., and Zhou, F. (2018). Effects of implicit and explicit gratitude on subjective well-being among college students. *Chin. J. Clin. Psych.* 26, 811–813. doi: 10.16128/j.cnki.1005-3611.2018.04.040

Liao, H. (2013). The relationship between learning burnout and academic stress in middle school. *Modern Prev. Med.* 40, 2664–2667.

Lorant, V., Deliège, D., Eaton, W., Robert, A., Philippot, P., and Ansseau, M. (2003). Socioeconomic inequalities in depression: a meta-analysis. *Am. J. Epidemiol.* 157, 98–112. doi: 10.1093/aje/kwf182

Luo, L., and Zhou, T. (2015). The relationship between gratitude and subjective well-being for middle-school students: the mediation role of anti-frustration ability and social support. *Psychol. Dev. Educ.* 31, 467–474. doi: 10.16187/j.cnki.issn1001-4918.2015.04.11

Luthar, S. S., and Latendresse, S. J. (2005). Children of the affluent: challenges to well-being. *Curr. Dir. Psychol. Sci.* 14, 49–53. doi: 10.1111/j.0963-7214.2005.00333.x

Ma, Y., and Liu, D. (2005). Middle school Students' learning-related subjective well-being and its major influencing factors. *Psychol. Dev. Educ.* 1, 74–79.

Ma, M., Liu, Y., and Zhao, N. (2021). The dark triad traits and the prediction of Eudaimonic well-being. *Front. Psychol.* 12, 693778–693778. doi: 10.3389/fpsyg.2021.693778

Manstead, A. (2018). The psychology of social class: How socioeconomic status impacts thought, feelings, and behaviour. *Br. J. Soc. Psychol.* 57, 267–291. doi: 10.1111/bjso.12251

McCullough, M. E., Kilpatrick, S. D., Emmons, R. A., and Larson, D. B. (2001). Is gratitude a moral affect? *Psychol. Bull.* 127, 249–266. doi: 10.1037/0033-2909.127.2.249

McDonald, M. M., Donnellan, M. B., and Navarrete, C. D. (2012). A life history approach to understanding the dark triad. *Personal. Individ. Differ.* 52, 601–605. doi: 10.1016/j.paid.2011.12.003

McGonagle, K. A., and Kessler, R. C. (1990). Chronic stress, acute stress, and depressive symptoms. *Am. J. Community Psychol.* 18, 681–706. doi: 10.1007/BF00931237

Mullen, B., Symons, C., Hu, L. T., and Salas, E. (1989). Group size, leadership behavior, and subordinate satisfaction. *J. Gen. Psychol.* 116, 155–170. doi: 10.1080/00221309.1989.9711120

Muris, P., Meesters, C., and Timmermans, A. (2013). Some youths have a gloomy side: correlates of the dark triad personality traits in non-clinical adolescents. *Child Psychiatry Hum. Dev.* 44, 658–665. doi: 10.1007/s10578-013-0359-9

Navarro-Carrillo, G., Alonso-Ferres, M., Moya, M., and Valor-Segura, I. (2020). Socioeconomic status and psychological well-being: revisiting the role of subjective socioeconomic status. *Front. Psychol.* 11:1303. doi: 10.3389/fpsyg.2020.01303

Nielsen, I., Smyth, R., and Liu, Y. (2011). The moderating effects of demographic factors and hukou status on the job satisfaction–subjective well-being relationship in urban China. *Int. J. Hum. Resour. Manag.* 22, 1333–1350. doi: 10.1080/09585192.2011.559103

Peng, X., Cai, T., Gui, T., and Fu, J. (2021). Moderating effect of psychological sushi on relationship between study stress and suicidal ideation in adolescents. *Chin. Ment. Health J.* 35, 919–924. doi: 10.3969/j.issn.1000-6729.2021.11.006

Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., and Podsakoff, N. P. (2003). Common method biases in behavioral research: a critical review of the literature and recommended remedies. *J. Appl. Psychol.* 88, 879–903. doi: 10.1037/0021-9010.88.5.879

Qin, F. (2013). Moral psychological studies on Machiavellianism. *Psychol. Explor.* 33, 15–21. doi: 10.3969/j.issn.1003-5184.2013.01.003

Rauthmann, J. F. (2011). Acquisitive or protective self-presentation of dark personalities? Associations among the dark triad and self-monitoring. *Personal. Individ. Differ.* 51, 502–508. doi: 10.1016/j.paid.2011.05.008

Rehman, U., Nabi, A., and Shahnawaz, M. G. (2018). Machiavellianism, influential tactics and well-being among Indian college students. *Psychol. Stud.* 63, 42–51. doi: 10.1007/s12646-018-0443-0

Shen, C., Li, H., Song, W., Jiang, S., and Bao, J. (2021). The effect of stressful life events on non-suicidal self-injury in Chinese adolescents: the moderating role of positive youth development. *Chin. J. Clin. Psych.* 29, 483–488. doi: 10.16128/j.cnki.1005-3611.2021.03.008

Sherry, S. B., Hewitt, P. L., Besser, A., Flett, G. L., and Klein, C. (2006). Machiavellianism, trait perfectionism, and perfectionistic self-presentation. *Personal. Individ. Differ.* 40, 829–839. doi: 10.1016/j.paid.2005.09.010

Shi, L., Chen, Y., Hou, X., and Gao, F. (2013). Social economic status and study engagement: the mediating effects of academic self-efficacy among junior high school. *Psychol. Dev. Educ.* 29, 71–78. doi: 10.16187/j.cnki.issn1001-4918.2013.01.006

Singh-Manoux, A., Marmot, M. G., and Adler, N. E. (2005). Does subjective social status predict health and change in health status better than objective status? *Psychosom. Med.* 67, 855–861. doi: 10.1097/01.psy.0000188434.52941.a0

Song, L., Liu, R., Li, Y., Gao, Z., and Li, W. (2010). The influence of social support, learning view and self-efficacy on middle school Students' learning-related subjective well-being. *Psychol. Dev. Educ.* 26, 282–287. doi: 10.16187/j.cnki.issn1001-4918.2010.03.012

Suh, E., Diener, E., and Fujita, F. (1996). Events and subjective well-being: only recent events matter. *J. Pers. Soc. Psychol.* 70, 1091–1102. doi: 10.1037/0022-3514.70.5.1091

Tan, J. J., Kraus, M. W., Carpenter, N. C., and Adler, N. E. (2020). The association between objective and subjective socioeconomic status and subjective well-being: a meta-analytic review. *Psychol. Bull.* 146, 970–1020. doi: 10.1037/bul0000258

Tenenbaum, H. R., and Ruck, M. D. (2007). Are teachers' expectations different for racial minority than for European American students? A meta-analysis. *J. Educ. Psychol.* 99, 253–273. doi: 10.1037/0022-0663.99.2.253

Thompson, M. N. (2013). Career barriers and coping efficacy among native American students. *J. Career Assess.* 21, 311–325. doi: 10.1177/1069072712471501

Van Groningen, A. J., Grawitch, M. J., Lavigne, K. N., and Palmer, S. N. (2021). Every cloud has a silver lining: Narcissism's buffering impact on the relationship between the dark triad and well-being. *Personal. Individ. Differ.* 171:110549. doi: 10.1016/j.paid.2020.110549

Walberg, H. J., and Tsai, S. L. (1983). Matthew effects in education. *Am. Educ. Res. J.* 20, 359–373.

Wang, Q., and Liu, X. (2021). Peer victimization and nonsuicidal self-injury among Chinese left-behind children: the moderating roles of subjective socioeconomic status and social support. *J. Interpers. Violence* 36, 11165–11187. doi: 10.1177/0886260519897346

Wanous, J. P., and Reichers, A. E. (1996). Estimating the reliability of a single-item measure. *Psychol. Rep.* 78, 631–634. doi: 10.2466/pr0.1996.78.2.631

Wanous, J. P., Reichers, A. E., and Hudy, M. J. (1997). Overall job satisfaction: how good are single-item measures? *J. Appl. Psychol.* 82, 247–252. doi: 10.1037/0021-9010.82.2.247

Watson, D., and Clark, L. A. (1992). On traits and temperament: general and specific factors of emotional experience and their relation to the five-factor model. *J. Pers.* 60, 441–476. doi: 10.1111/j.1467-6494.1992.tb00980.x

Watson, D., Wiese, D., Vaidya, J., and Tellegen, A. (1999). The two general activation systems of affect: structural findings, evolutionary considerations, and psychobiological evidence. *J. Pers. Soc. Psychol.* 76, 820–838. doi: 10.1037/0022-3514.76.5.820

Wei, C., Wu, H. T., Kong, X. N., and Wang, H. (2011). Revision of Gratitude Questionnaire-6 in Chinese adolescent and its validity and reliability. *Chin. J. Sch. Health.* 32, 1201–1202. doi: 10.16835/j.cnki.1000-9817.2011.10.016

Wood, A. M., Froh, J. J., and Geraghty, A. W. (2010). Gratitude and well-being: a review and theoretical integration. *Clin. Psychol. Rev.* 30, 890–905. doi: 10.1016/j.cpr.2010.03.005

Xie, X., Zhang, W., Yu, C., Zhou, Y., Ye, H., and Chen, J. (2013). Adolescent materialism and well-being: a mediating effect of gratitude. *J. Psychol. Sci.* 36, 638–646. doi: 10.16719/j.cnki.1671-6981.2013.03.011

Yan, W., Zhang, L., Li, W., You, X., and Kong, F. (2022). Associations of family subjective socioeconomic status with hedonic and eudaimonic well-being in emerging adulthood: a daily diary study. *Soc. Sci. Med.* 298:114867. doi: 10.1016/j.socscimed.2022.114867

Yang, M., Guo, H., Chu, M., Leng, C., Qu, C., Tian, K., et al. (2022). Sex differences in traditional school bullying perpetration and victimization among adolescents: a chain-mediating effect. *Int. J. Environ. Res. Public Health* 19:9525. doi: 10.3390/ijerph19159525

Yang, X., Qi, Y., Shen, Z., Han, B., and Meng, B. (2015). Family socioeconomic status, vocational value on subjective well-being in medical students. *Chin. J. Clin. Psych.* 23, 154–158. doi: 10.16128/j.cnki.1005-3611.2015.01.035

Yang, K., Yan, W., Jia, N., Wang, Q., and Kong, F. (2021). Longitudinal relationship between trait gratitude and subjective well-being in adolescents: evidence from the bi-factor model. *J. Posit. Psychol.* 16, 802–810. doi: 10.1080/17439760.2020.1818812

Yang, Q., and Ye, B. (2014). The effect of gratitude on Adolescents' life satisfaction: the mediating role of perceived social support and the moderating role of stressful life events. *J. Psychol. Sci.* 37, 610–616. doi: 10.16719/j.cnki.1671-6981.2014.03.018

Yang, M., Zhu, X., Sai, X., Zhao, F., Wu, H., and Geng, Y. (2019). The dark triad and sleep quality: mediating role of anger rumination. *Personal. Individ. Differ.* 151:109484. doi: 10.1016/j.paid.2019.06.027

Yao, B., Zhou, X., Quan, L., and Zhang, L. (2015). The investigating of situation and factors of adolescents' ideals in China. *Psychol. Dev. Educ.* 31, 71–77. doi: 10.16187/j.cnki.issn1001-4918.2015.01.10

Yu, Y., and Zheng, X. (2005). Psychological stress and influencing factors of graduate students. *Psychol. Dev. Educ.* 3, 99–103.

Zhang, L., and Hou, X. (2010). Gratitude: concept, measurement and related studies. *Psychol. Sci.* 33, 393–395. doi: 10.16719/j.cnki.1671-6981.2010.02.031

Zhang, Y., Yuan, B., Wang, K., and Shen, T. (2021). The effect of impulsivity traits on senior high school students' suicidal ideation: the role of campus exclusion and sense of life meaning. *Stud. Psychol. Behav.* 19, 89–95.

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Among underserved children, behavioral self-regulation most consistently predicts early elementary teachers' ratings of overall social–emotional learning

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The need for strengths-based perspectives on how children develop social–emotional learning (SEL) is especially pronounced in the context of research conducted with communities challenged by few resources and a history of oppression. This study included 313 underserved, primarily Black children who were assessed with several SEL building block measures at kindergarten entry. Specifically, we asked which SEL building blocks contributed to longitudinal teacher ratings of overall SEL on the Devereux Strengths and Skills Assessment (DESSA), collected four times during kindergarten and first grade. In separate models accounting for classroom membership, multiple kindergarten-entry SEL building blocks, including theory of mind, emotion, and situational knowledge, explained variance in teacher perceptions of children's overall SEL at various time points after controlling for working memory and expressive vocabulary. In a single model that included all kindergarten-entry SEL building blocks, behavioral self-regulation most consistently predicted teachers' overall SEL ratings over time. Even so, other SEL building blocks including theory of mind and emotion and situational knowledge should not be discounted because they also predicted variance in teacher-rated SEL at individual time points. A major implication of this study points to the importance of directly assessing building blocks of SEL at kindergarten entry, especially behavioral self-regulation, to effectively support children from underserved communities.

KEYWORDS

socioemotional learning, school readiness, behavioral self-regulation, emotion knowledge, theory of mind, underserved children, DESSA

Introduction

Understanding children's strengths is increasingly recognized as part of supporting development, including a successful transition to formal schooling (Harvey, 2014). Emphasizing strengths and protective processes is especially critical in changing the deficit narrative in research among children of color from underserved communities (Climie and Henley, 2016; Doromal et al., 2019). Strengths-based approaches complement research on the genuine challenges that poverty contexts pose to children's healthy development, and can illuminate different policy solutions and counter stigma (Frankenhuis and Nettle, 2020). For instance, individuals may develop unique strengths in particular skill areas as a result of responsive adaptations to their socio-cultural contexts that are important for practitioners, like teachers, to understand (Miller-Cotto et al., 2022).

Children's social–emotional learning (SEL) is especially important for promoting their well-being, positive development, and academic learning over time (Durlak et al., 2015; Immordino-Yang et al., 2019; Darling-Hammond et al., 2020). Young people with strong overall SEL form closer relationships with teachers, get along better with their peers, have lower rates of externalizing and internalizing behaviors, and achieve at higher levels (Jones and Kahn, 2017). Many elementary school systems use parent or teacher survey measures to learn about children's social, emotional, and behavioral functioning. But, schools can benefit from having earlier guidance on which specific building block skills contribute to overall SEL over time. Research-based information on the building blocks of children's SEL at kindergarten entry can supplement practitioners' efforts in providing support throughout the multi-year transition to formal schooling (Raver, 2002; Denham, 2006; Duncan et al., 2007; Denham et al., 2012; Rosanbalm, 2021). The aim of this study was to understand which building blocks of SEL, timed at the kindergarten transition, are associated with kindergarten and first grade teachers' ratings of children's overall SEL in an underserved community. This work adds to the research base on school-entry predictors of overall SEL in early elementary school, and provides useful insight for practitioners to effectively target relational and social supports during children's school transition.

Children's social and emotional learning skills

Young children need to be supported in developing a broad set of skills, beyond academic skills, to be successful in school and beyond. Social and emotional skills have been linked to numerous positive outcomes, including learning, prosocial behaviors, and reduced criminal behavior (Durlak et al., 2011; Jones and Kahn, 2017). Similar to other definitions [e.g., the Collaborative for Social and Emotional Learning (CASEL)s framework], this study defines SEL as a process through which children and adults discern and use emotional information to manage self, relationships, and situations. SEL is multifaceted and is made up of broad, interrelated domain areas, including self-awareness, self-management, social awareness, relationship skills, and responsible decision-making (Weissberg et al., 2015). Children who demonstrate strong SEL are able to recognize and understand their own emotions and thoughts and how they affect behaviors; regulate these emotions and related behaviors in different settings; take others' perspectives including empathizing with others from different backgrounds and cultures, and connect and communicate effectively with other people; and make safe, healthy, and constructive choices that benefit their own and others' well-being (Denham et al., 2010; Greenberg, 2017). We use the term "overall SEL" to refer to multiple inter-related domains measured as a set.

Building block skills that contribute to overall SEL

SEL relies on multiple building blocks that indirectly or directly set the foundation for SEL development early in life (McKown et al., 2009). These building blocks are numerous; in this study, we include key contributors to SEL based on prior research, namely children's behavioral self-regulation, delay of gratification, emotion and situational knowledge, and theory of mind. Through one commonly used lens, these four building blocks share the feature of being "hot" constructs; that is, entailing social–emotional and/or motivational consequences (Fernández García et al., 2021). In a systematic review, Fernández García et al. found that hot tasks were less commonly studied than so-called "cool" tasks that carry relatively less emotional or motivational weight, while also noting the overlap and inter-relatedness of hot and cool assessments (Zelazo and Carlson, 2012).

Behavioral self-regulation

Children use behavioral self-regulation to manage their attention and behavior, and this skill is involved in making decisions, setting goals, and controlling or modifying impulses. Effective behavioral self-regulation draws from the set of cognitive processes known as *executive function* (EF), which has been proposed as a "top-down" set of cognitive processes involving deliberate attention and intentional redirection of impulses to align with one's goals (Zelazo and Carlson, 2012; Blair and Raver, 2015). Three primary EF processes include inhibitory control, working memory, and switching (Miyake et al., 2000; Garon et al., 2008). Here, we conceptualize behavioral self-regulation as applying multiple cognitive processes to regulate one's gross motor behavior or "EF in context." Some propose that, together with the temperament construct of effortful control, EF falls under the larger umbrella of self-regulation (Bailey and Jones, 2019; Schmidt et al., 2022). In this study, we define *behavioral self-regulation* as multiple EFs

operating together in a real-life situation (McClelland and Cameron, 2012; McClelland et al., 2014).

While much of the literature on children's behavioral self-regulation and EF has focused on establishing links with academic outcomes such as achievement and engagement (McClelland et al., 2006; Blair and Razza, 2007; Rimm-Kaufman et al., 2009), these constructs exist within a larger framework where attention and emotional reactivity develop together within social and relational contexts that either support or discourage the emergence of a child's ability to override short-term impulses and make deliberate choices whose benefits unfold only over the long-term (Rudasill and Konold, 2008; Olson et al., 2011; Spilt et al., 2012; Blair and Raver, 2015; Russell et al., 2016; Housman, 2017). Especially for children experiencing poverty, the development of EF and behavioral self-regulation has serious implications for school performance in part due to the reciprocal associations between these processes and effective emotional regulation and social relationship formation (Calkins, 2007; Hughes and Ensor, 2011; Raver, 2012; Blair and Ku, 2022).

A few studies with a range of samples have shown positive associations where children rated by parents or teachers with stronger behavioral self-regulation—or the related construct of effortful control—were judged as more socially adept (McClelland et al., 2000, 2006; Rudasill and Konold, 2008; McKown et al., 2009). Studies directly measuring behavioral self-regulation have shown mixed results; Montroy et al. (2014) found that preschoolers with better behavioral self-regulation earned higher teacher ratings of social skills. In contrast, in another study using data from two sites, kindergarteners' directly assessed fall behavioral self-regulation was *not* associated with end-of-year teacher-rated interpersonal skills (Cameron Ponitz et al., 2009). Both these study samples included children from relatively educated families. How children's behavioral self-regulation when it is directly assessed at the start of formal schooling may contribute to teacher-reported overall SEL in early elementary school needs to be clarified and systematically studied, especially for children living in poverty and in different socio-cultural contexts.

Delay of gratification

Delay of gratification is a type of inhibitory control related to decision-making, specifically pertaining to forgoing a smaller reward immediately for the chance of a larger reward later. In deciding to delay, children must understand the consequences of their choice and overcome the strong inclination for immediate satisfaction (Diamond, 2016). Long-term thinking is most apparent in individuals with stronger ability to delay gratification (Göllner et al., 2017). Blair and Raver note that in the context of poverty, the prevalence of uncertainty about the future–in income, housing, or social relationships–and relatedly, high levels of trauma, change how EF and self-regulation develop (Blair and Raver, 2012, 2015). In resource-scarce contexts, the deliberate practice, attention, and considered choice-making that are required for EF development under optimal conditions are not as important as making choices for the immediate situation to ensure basic needs are met (Miller-Cotto et al., 2022). Thus, impulsiveness—not delaying gratification—becomes adaptive, at least in the short term.

Historically, most studies have shown positive associations between delay tasks and school-related outcomes (Shoda et al., 1990; Watts et al., 2018): that is, children who can (or who choose to) wait for a small reward has better learning and life outcomes than those who cannot. But context matters for delay of gratification, and laboratory studies show children are capable of using information from the context to decide whether to delay or not (Lee and Carlson, 2015). In one such study, 4.5-year-old children opted not to delay or delayed for a shorter time when the adult who promised a reward had just proven themselves untrustworthy (Kidd et al., 2013). In a correlational study, children in impoverished settings who chose *not* to delay actually had higher behavioral self-regulation, academic skills, and fewer teacher-rated problem behaviors, relative to children who consistently waited for a series of small rewards (Duran and Grissmer, 2020). Findings about context-dependent delay skills urge researchers to clarify how children's delay of gratification is associated with teacher-rated SEL in historically oppressed communities (Miller-Cotto et al., 2022).

Emotion and situational knowledge

Emotion and situational knowledge, which includes familiarity with emotion words and facial expressions; and an understanding of which emotions or facial expressions are likely in certain situations, combine to form another key building block that undergirds SEL (Denham, 2006). When children are aware of and can label strong feelings—of themselves and others—they are better equipped to navigate emotion-rich social situations. Both correlational and experimental research conducted with children from oppressed backgrounds near the school transition confirms this connection, where those with better emotion knowledge have better SEL outcomes including less aggression and withdrawal; and greater peer relationship, cooperation, and learning skills (Schultz et al., 2001; Miller et al., 2005; Izard et al., 2008). Furthermore, Denham et al. found that preschoolers with more adept knowledge of emotion situations were rated by their kindergarten teachers as having greater social competence (Denham et al., 2003). Similar associations have been found in cross-sectional studies (McKown et al., 2009; Brock et al., 2019b). In this study, we examined how and whether kindergarten-entry emotion and situational knowledge is associated with teacher-rated SEL during kindergarten and first grade.

Theory of mind

Theory of mind develops over the early childhood period and refers to children's understanding that other people have different knowledge, beliefs, desires, and emotions than they themselves do (Wellman and Liu, 2004; Wang, 2015). The application of one's theories of mind is likely to depend on context cues, such as the specific people involved, a social script such as getting ready to go home for the day, or other aspects of a given situation (Hughes and Devine, 2015). In their meta-analytic review that included mostly White middle-class children, researchers reported a small but consistent association between theory of mind and prosocial behavior (Imuta et al., 2016). In contrast, Olson et al. (2011) reported that preschoolers' theory of mind was not associated with their observed aggressive behavior, after controlling for self-regulation.

Other studies that include low-income or historically marginalized populations have shown that children with more developed theory of mind before kindergarten entry have better school success, including achievement, teacher-reported socioemotional skills, more closeness within the teacher-child relationship, and fewer behavioral difficulties, even after controlling for EF, verbal ability, and emotion knowledge (Razza and Blair, 2003; Caputi et al., 2012; Brock et al., 2019a,b). One explanation for a lack of association between theory of mind and SEL after accounting for self-regulation is that knowing the mental state of other people is not as important as being able to control one's impulses during interactions (Olson et al., 2011). On the other hand, exercising theory of mind may itself draw on regulatory processes, including working memory and inhibitory control during social situations (Brock et al., 2019b). Inconsistencies in the research leave questions about what skill or skills are most important for schools to assess at the transition to kindergarten. An inquiry to disentangle whether theory of mind as a kindergarten-entry SEL building block is associated with kindergarten and first grade teacher-rated SEL, while controlling for other SEL building blocks in an impoverished sample, is needed.

Rationale and research questions for the present study

Given the intertwined nature of early cognitive, academic, and SEL development (Jones and Kahn, 2017; Cameron et al., 2019) and the way that poverty affects all of these (Raver, 2012), the goal of this study is to explore which building blocks and at what point are important for the development of children's SEL. The findings from this study have the potential to provide practitioners working in historically oppressed communities with a more holistic picture of children when they begin school, as well as how best to promote healthy social, emotional, and academic development for underserved children. In addition, this study can provide empirical evidence of the associations between cognitive, academic, and SEL processes rather than assuming associations that may be accepted as normative because they have been established with more privileged populations (Frankenhuis and Nettle, 2020; Miller-Cotto et al., 2022).

The combination of measures with social–emotional implications that are available in this study is especially unusual in an underserved community comprised primarily of children of color. Research has established that children's skills in self-regulatory and academic domains develop concurrently over the school transition (Cameron et al., 2019), and that some skill components explain academic outcomes better than other skill components (McClelland et al., 2014). Fewer studies have examined how different SEL building blocks contribute, uniquely and jointly, to early elementary teachers' ratings of overall SEL measured over the school transition. Information about which early SEL building blocks are most strongly associated with teacher perceptions of children's SEL is important to gather as SEL learning standards become more common across the United States (Blad, 2016) and as government and private sponsors of research prioritize early education and holistic assessment, beyond traditional academic skills, in the wake of COVID-19 school shutdowns (Ghosh, 2021; The White House, 2021). To fill these gaps and inform education for 21st century learning, of which SEL is a critical element, we pose the following research questions and hypotheses:

1. *Which of children's SEL building blocks, assessed directly at kindergarten entry, explain their overall SEL reported by kindergarten and first grade teachers during the transition to elementary school?*

Given the complexity of the SEL construct, and the diversity of domains that comprise SEL strengths measures (Doromal et al., 2019), we expected that each of the building blocks would show individual positive associations with teachers' perceptions of children's overall SEL; with stronger associations at earlier time points.

2. *When examining all SEL building blocks measured at kindergarten entry together, which components uniquely contribute to teacher ratings of overall SEL during the school transition?*

Based on previous work that included two or more of the SEL building blocks in the same model (Blair and Razza, 2007; McKown et al., 2009), we expected that behavioral self-regulation, theory of mind, and emotion and situational knowledge would show independent or unique associations with overall SEL at multiple times, even when included in the same model.

Materials and methods

This study was part of a larger mixed methods evaluation using a randomized controlled trial (RCT) design on the

effects of an existing after-school SEL program operating in a highly impoverished area of a Southeast U.S. state (Brock et al., 2018). The University of Virginia IRB and the IRB at an institution in the city where data were collected approved all study procedures. Families provided signed informed consent to signal their interest in the program and agreed to participate in a lottery prior to kindergarten entry, such that random assignment determined whether a child could attend the after-school SEL program. Participating children in the larger study were recruited in 3 consecutive years and each of these three cohorts followed over a 3-year period (i.e., through the end of second grade). All children initially attended one of four schools local to the area; one school closed during the study period. As such, teachers who provided reports of children's overall SEL were also employed at one of these four schools. In this sample, 71% of teachers reported their race or ethnicity as Caucasian/White, and 24% reported African American/Black. Teachers' ages ranged from 23 to 62 years old.

This study included children with a valid baseline measure of teacher-reported SEL, which yielded an analytic sample of 313 children. The sample represented the community, and was characterized as high-poverty and high-risk: just over 96% of children received free or reduced-price lunch, and 29% of caregivers reported less than a high school degree as their highest level of education. Ninety-one percent of children's caregivers reported their race as Black or African American, and the remaining groups included White (3%), Hispanic and/or Latinx (5%), Asian (<1%), or other race (<1%). Just over half (55%) of children were female.

Procedure

This study included data collected directly from children the summer and fall of kindergarten entry, and from children's teachers during the fall and spring of kindergarten and first grade. Each summer before children entered kindergarten, the study hosted a week-long summer camp to provide childcare for the entire sample and to administer assessments. Research assistants with experience working in the community administered all assessments in two separate batteries lasting 30–45 min each. About two-thirds of children in each cohort were assessed at the summer camps while the remaining third were assessed at school, within the first few months of their kindergarten year. In each fall and spring, kindergarten and first grade teachers rated children on their overall SEL.

Measures

Social–emotional learning building block assessments were collected before or very shortly after random assignment. Teachers did not know children's assignment to the RCT condition of attending the after-school program or not, and we also controlled for treatment status in analyses.

Teacher reports of children's overall SEL

We used the Devereaux Student Strengths Assessment (DESSA; LeBuffe et al., 2018) to capture teachers' reports of children's overall SEL at kindergarten entry, our primary dependent variable for the study. The DESSA is an empirically sound, widely used, strength-based behavioral rating scale that assesses social and emotional strengths of children that promote positive development (LeBuffe et al., 2018). Each positively-worded item is rated on a five-point scale (1 = "never" to 5 = "very frequently"). This measure is not developmentally normed because SEL domains are generally not expected to improve with development but instead are context-dependent.

We used an adapted version covering five subscales that align with our definition of social–emotional learning: self-awareness (seven items), social awareness (nine items), responsible decision-making (eight items), self-management (11 items), and relationship skills (10 items). Scores for each subscale were computed as the average of all items associated with that subscale. We then created an overall SEL composite by averaging all the subscale scores. Validity of scores and the use of the SEL composite derived from this adapted version of the DESSA among low-income kindergarten samples has been established in prior studies (Doromal et al., 2019), and within the present study sample, items demonstrated high internal consistency ($\alpha \geq 0.90$).

Kindergarten-entry SEL building blocks

Assessments of SEL building blocks were directly administered the summer before and fall of kindergarten entry, and served as independent variables.

Behavioral self-regulation

Children's behavioral self-regulation was assessed using the Head-Toes-Knees-Shoulders task (HTKS; Cameron Ponitz et al., 2009; McClelland et al., 2014), which is informed by the Head-Feet task (McCabe et al., 2004) originally designed as a culturally-responsive, game-based measure (Miller-Cotto et al., 2022) that could be given in home or school settings. The HTKS begins by having children practice doing "the opposite," and then they are told to touch their head when told to touch toes and vice versa (Part I); two later parts (Parts II and III) add complexity for more advanced scorers. Feedback, including positive praise for correct answers, is given during practice but not test items. Studies using different samples indicate that the HTKS requires inhibitory control, working memory, and switching (Cameron Ponitz et al., 2009; McClelland et al., 2014; Gonzales et al., 2021). The version of the HTKS used in this study was the three-part version, and consistent with current author recommendations all 17 practice and 30 test items were included in the final score. Each item was scored 0, 1, or 2 (incorrect, self-corrected, or correct response),

and a composite score was computed by summing across all scored items. The 47 items demonstrated high internal consistency for our sample ($\alpha = 0.93$).

Choice delay of gratification

The choice delay of gratification task presented children with multiple choices of stickers or candies. The task began with the research assistant modeling an immediate gratification behavior and a delay of gratification behavior. In six trials, children could choose one sticker/candy now; and either two, four, or six of the desired items later, which were placed in a plastic bag and sent home in the child's backpack. Scores were calculated by summing the number of times the child delayed; a higher score indicated greater delay of gratification. Internal reliability in the present sample was $\alpha = 0.83$; a separate published factor analysis also found a single factor and strong psychometric properties (Duran and Grissmer, 2020).

Theory of mind

To measure theory of mind—the ability to understand mental functions and others' point of views, we used the eponymous subtest from the NEuroPSYchological (NEPSY-II, Korkman et al., 2007) which is considered a comprehensive assessment because it measures multiple aspects of theory of mind (Beaudoin et al., 2020). This subtest involved two parts, verbal and contextual. The verbal task consisted of 15 items that measures children's understanding of someone else's thoughts, ideas, and feelings (e.g., "When Andre opened the cookie box, he saw spaghetti in there… His brother came in and saw the cookie box. What did his brother think was in the box?"). The contextual task included six items that assess children's ability to relate emotion to social context. For instance, children were shown drawings of scenarios that happen to Julia, as well as four photographs of Julia's face, and they had to identify which one of the photographs showed how Julia feels. All 21 items were summed ($\alpha = 0.83$), and raw scores were used in analyses.

Emotion and situational knowledge

To measure emotion and situational knowledge, we drew from two established measures, the Emotion Matching Task (Morgan et al., 2009) and the Assessment of Children's Emotion Skills (Schultz et al., 2004). For the larger longitudinal study, the research team created a combined measure called the EMT-ACES, which used 48 items from the EMT and 18 items from the ACES. We developed this combined measure, validated in a prior study (Brock et al., 2019b), to avoid ceiling effects that piloting indicated would occur with the EMT; and to avoid floor effects had we administered the ACES alone. The first cohort did not receive ACES items if they did not score at least 50% on one of the four EMT parts. This study's combined EMT-ACES measure showed internal reliability for this sample ($\alpha = 0.93$); EMT-only items were $\alpha = 0.83$, and ACES-only items were $\alpha = 0.96$.

The EMT assessed emotion knowledge with four sets of 12 items, which were all retained in the composite measure. In part 1, matching expressions, the researcher said, "show me which one of these children feels the same way as this one" while displaying elementary-school children's faces in a set of four photos. In part 2, expression-matching situation, the researcher asked children to match one of four facial expressions with situations and causes. For example, children are shown four photos and asked "show me the one whose mom is sick and has to go to the hospital." In part 3, expression labeling, the researcher displayed a single photo and asked children to say a word that expresses how that person feels. In part 4, expression-labeling matching, the researcher asked children to match emotion expressions to emotion labels (e.g., "show me the one who feels happy").

The ACES assessed children's emotion attribution accuracy and anger attribution tendencies. ACES include sections concerning facial expressions, social behaviors, and social situations. Because EMT also includes facial expression items, the present study omitted ACES facial expression items. In the ACES social behaviors section (10 items in the present study), children listened to 1–3 sentence items that describe a child's behavior (such as sitting alone, or being hit) and then labeled the protagonist's feeling by choosing happy, sad, mad, scared, or no feeling. In the ACES social situations section (eight items in the present study), children listened to 1–3 sentence items describing an emotion-eliciting situation, such as not getting to go to the park, and were asked to label the protagonist's feeling by choosing happy, sad, mad, scared, or no feeling. Each item has a correct score associated with the most common responses from adults in prior research (Schultz and Izard, 1998), and total scores were summed.

Control variables

Consistent with other studies using these project data (Brock et al., 2019b), we controlled for treatment status (0 = control group; 1 = treatment group), caregiver's education (0 = did not complete HS; 1 = high school diploma or greater), financial strain (three items on a five-point scale with higher ratings indicating more strain; Vinokur et al., 1996), children's preschool attendance (0 = did not attend preschool; 1 = attended preschool), and age. Following prior research, our analyses also controlled for general language and working memory which is a "cool" aspect of EF (Fernández García et al., 2021) and the one most closely related to IQ (Fukuda et al., 2010). Controlling for each of these skills helps ensure that associations could not be explained by an understanding (or lack of understanding) of the tasks given.

Expressive language

We used the Differential Ability Scales II (DAS; Elliott, 2007) Naming Vocabulary subtest to assess children's expressive language with 34 items of increasing difficulty. The researcher displayed a colorful picture of an item in a flipbook and asked the child to identify it verbally. Children had to avoid more than three incorrect scores to move to the next section. Items demonstrated adequate internal consistency for this sample ($\alpha = 0.81$).

Working memory

We used the Differential Ability Scales II (DAS; Elliott, 2007) Recall of Sequential Order subtest to assess children's working memory. Across a series of 32 items ($\alpha = 0.89$) increasing in complexity, the researcher asked children to engage in short-term recall of verbal and pictorial information. Specifically, the researcher stated body parts in random order (such as elbow, ankle, and neck), and children had to remember and restate a progressively longer list of body parts from highest to lowest. Items demonstrated adequate internal consistency for this sample ($\alpha = 0.78$).

Analytic strategy

We first examined descriptive statistics, correlations, and the percentage of missing data for all study variables. We then examined associations using multi-level linear modeling, which accounted for the nested structure of children within classrooms. Analyses were conducted using SPSS 27.0 (IBM Corp, 2021) and Stata 16.0 (StataCorp, 2019). The option "vce(cluster *idvar*)" was used in Stata to produce clustered standard errors at the classroom level to account for potential heteroskedasticity.

The primary aims of this study were to understand which of children's directly assessed SEL building blocks individually and jointly predicted kindergarten and first grade teachers' rating of children's concurrent and later overall SEL. Modeling these associations required consideration of the nested structure of the data, specifically, outcomes for children in the same classroom were reported by the same teacher, and these potential rater effects were likely to explain variance in outcomes (Mashburn et al., 2006). As expected, in our data, intraclass correlation coefficients (ICCs), which represent the amount of variance at the teacher as opposed to child level, ranged from 0.11 to 0.34 across outcomes.

To account for these concerns, we estimated all associations using a two-level hierarchical linear modeling framework, using the "mixed" command in Stata. Because we were not interested in interactions across levels, we tested a random-intercept, fixed slope model. All predictor variables were grand-mean centered for ease of interpretation, and continuous variables were transformed to standard-deviation units.

The model equations are:

Level 1:

$$Y_{ij} = \beta_{0j} + \beta_1 \left(SELBlock\right)_i + \boldsymbol{X_i} + e_{ij}$$

Level 2:

$$\beta_{0j} = \gamma_{00} + u_{0j}$$

In this model, we regressed teachers' DESSA ratings Y_{ij} on each SEL building block $\left(SELBlock\right)_i$ as well as the set of covariates $\boldsymbol{X_i}$. Here, β_1 represents the association between a single SEL building block and the teacher-reported SEL composite. Level 2 did not introduce new predictor variables (because all variables are at the child level), but it did include a teacher-level random effect. The error term e_{ij}, which represents the variation between children within the same teacher, was assumed to be independent and normally distributed with mean 0 and variance σ^2. Similarly, the error term u_{0j} is the variation between teachers and was assumed normally distributed with mean 0 and variance σ^2.

To address the first research question, we ran four similar models ("Separate Predictor Models") predicting teacher-rated overall SEL with each individual SEL building block entered separately (behavioral self-regulation, emotion knowledge, theory of mind, and choice delay) while controlling for working memory and expressive language. We ran 16 total models (four SEL building blocks predicting teacher-rated overall SEL at four different time points). To account for familywise error rates, we used Bonferroni correction methods to account for multiple comparisons across models grouped by the SEL building block (i.e., we examined results across four models within each SEL building block and applied a threshold of $p = 0.05/4 = 0.0125$ for reporting statistical significance).

To address the second research question, we ran a single model with all four SEL building blocks and two controls included simultaneously as predictor variables of teacher-rated overall SEL at four time points. Given that these SEL building blocks develop concurrently over the formal school transition, this approach (the "Comprehensive Model") considered how these skills jointly predict teacher reports of children's overall SEL and indicated whether any single skill was responsible for more of the variance. Here we ran four models total, one model for each of four time points for teacher-rated overall SEL. We applied adjustments for multiple comparisons when assessing statistical significance of the results across models.

Missing data

After construction of the analytic sample, all participants had complete data on the first time point of the DESSA. Attrition over time appeared to be the biggest contributor to missing data, with more than one third of children missing first grade DESSA scores; there were far lower missingness rates among baseline demographic variables. To assess whether missingness was systematically associated with child characteristics, we conducted a set of logistic regressions where a dichotomous indicator for missing data was regressed on available demographic characteristics. This analysis revealed that observable baseline characteristics did not predict missingness in teacher reports of overall SEL at future time points. Missing data were multiply imputed using chained equations in Stata 16, and all estimates were combined across 20 imputed datasets (von Hippel, 2007).

TABLE 1 Summary statistics for study variables (N=313).

	% missing	Mean	SD	Min	Max
Demographic Characteristics					
Child age in years	0%	5.48	0.31	4.40	6.18
Child is female	0%	0.55			
Child race/ethnicity	10%				
African American/Black		0.90			
Hispanic/Latino		0.05			
Caucasian/White/Other		0.04			
Caregiver has high school degree or higher	12%	0.71			
Financial strain (baseline)	10%	2.01	0.91	1	5
Treatment status	0%	0.58			
Child participated in Pre-K	10%	0.90			
Expressive vocabulary (baseline)	1%	20.03	3.41	9	26
Working memory (baseline)	1%	1.20	2.26	0	14
SEL Building Blocks at Kindergarten Entry					
Behavioral self-regulation	1%	29.67	26.97	0	88
Choice delay of gratification	1%	3.14	2.22	0	6
Theory of mind	1%	10.88	4.06	3	21
Emotion and situation knowledge	1%	40.94	9.16	16	59
Teacher-Rated Overall SEL (DESSA)					
Kindergarten, fall	0%	3.63	0.73	1.19	4.98
Kindergarten, spring	3%	3.67	0.72	1.92	5
Grade 1, fall	34%	3.57	0.79	1.72	5
Grade 1, spring	38%	3.72	0.78	1.62	5

Demographic characteristics and SEL building blocks were measured at baseline (in the summer or early fall of kindergarten entry). DESSA, Devereux Student Strengths Assessment; SD, standard deviation.

Results

We report means and standard deviations for all study variables in Table 1. We note that, consistent with the developers' intentions, children's SEL ratings on the DESSA were relatively stable, rather than increasing, over time. We also examined correlations among all study variables, shown in Table 2. Here, we highlight only those correlations above $r = 0.30$ (all $ps < 0.01$): Children with stronger behavioral self-regulation scored higher on emotion situation knowledge ($r = 0.38$) and working memory ($r = 0.46$). Children with higher scores on theory of mind had higher working memory ($r = 0.32$) and emotion and situational knowledge ($r = 0.35$), and those with higher emotion and situational knowledge scored higher on theory of mind ($r = 0.35$) and expressive language ($r = 0.44$). Across time points, teacher ratings were positively correlated across a relatively wide range from $r = 0.24$–0.67. Additionally, children with higher choice delay scores had *lower* scores on most variables, but these correlations were relatively weak (below $r = 0.20$).

RQ1: Results from separate predictor models

Table 3 shows all results from the Separate Predictor Models, but we organize our findings by SEL building block. For example, the first row in Table 3 shows results where the direct measure of behavioral self-regulation was used to predict overall SEL at four time points (one in each column). Similarly, the second through fourth rows of Table 3 present results using choice delay, theory of mind, and emotion and situational knowledge as predictor variables, respectively.

Behavioral self-regulation

Children with higher kindergarten-entry behavioral self-regulation received significantly higher ratings on teacher-reported overall SEL at the three later time points. These positive associations with outcomes at all time points except for fall kindergarten held even after adjusting for several characteristics, including children's fall kindergarten overall SEL.

Choice delay of gratification

Lower scores on choice delay were associated with *higher* teacher ratings on overall SEL at the start of kindergarten; however, after accounting for multiple comparison adjustments, we could not conclude this association was statistically different from zero.

Theory of mind

For theory of mind, children with higher theory of mind at kindergarten entry earned higher teacher ratings of overall SEL at fall of kindergarten, but this association was not significant at any of the later time points.

Emotion and situational knowledge

Finally, children with better kindergarten-entry emotion and situational knowledge received significantly higher teacher reports of overall SEL, at the later three time points.

TABLE 2 Correlations using FIML between all continuous study variables (N=313).

		1	2	3	4	5	6	7	8	9	10	11	12
1	Child age (k.entry)	–	0.04	0.17	0.08	0.08	0.05	0.17	0.17	0.14	0.11	−0.04	0.04
2	Financial strain		–	−0.08	−0.05	−0.10	0.08	−0.04	−0.03	−0.15	−0.16	−0.04	−0.13
3	Expressive language (k.entry)			–	0.29	0.28	−0.10	0.26	0.44	0.18	0.18	0.17	0.11
4	Working memory (k.entry)				–	0.46	−0.12	0.32	0.27	0.18	0.21	0.20	0.22
5	Behavioral self-reg. (k.entry)					–	−0.23	0.29	0.38	0.19	0.31	0.35	0.37
6	Choice delay (k.entry)						–	−0.05	−0.12	−0.16	0.27	−0.10	−0.13
7	Theory of mind (k.entry)							–	0.35	0.22	0.27	0.18	0.26
8	Emotion sit. Know. (k.entry)								–	0.17	0.28	0.26	0.25
9	Teacher-rated SEL (fall k)									–	0.59	0.24	0.40
10	Teacher-rated SEL (spring k)										–	0.54	0.54
11	Teacher-rated SEL (fall first)											–	0.67
12	Teacher-rated SEL (spring first)												–

Regardless of sign, all correlations of magnitude above 0.10 were statistically significant at $p \leq 0.05$. Correlations of magnitude above 0.14 were statistically significant at $p \leq 0.01$.

Covariates had consistent associations in each of these models (not shown in Table 3): teachers rated girls with higher overall SEL at each time point; teachers rated children with higher working memory and lower financial strain with better overall SEL at fall kindergarten; and in the choice delay model only, first grade teachers rated children with better working memory with higher overall SEL in spring.

RQ2: Results from the comprehensive model

In Table 4, we present results from examining SEL building blocks comprehensively. Because predictor variables were standardized, we can interpret coefficients roughly as effect sizes and thus compare magnitudes across predictors to understand which building block measures are more strongly related to teachers' ratings of overall SEL. Using this approach, children with stronger school entry behavioral self-regulation earned higher ratings of overall SEL from their first grade teachers at both fall and spring. There were no other SEL building blocks that explained variance in overall SEL.

Regarding covariates, the strongest predictor of overall SEL at the later three time points was fall overall SEL. Gender remained a consistent predictor in the comprehensive model with girls advantaged at both spring time points. After adjusting for multiple comparisons, no other variables helped explain overall SEL ratings.

Discussion

Typically, research including children living in poverty takes a deficit perspective to describe how poverty and the surrounding contexts may lead to negative social and cognitive outcomes. Less often considered are the many strengths that children develop as a consequence of coping with the challenges in their lives (Frankenhuis and Nettle, 2020). This study takes a strengths-based approach by examining associations between several building blocks of SEL and teacher-rated overall SEL across 2 transition years, kindergarten and first grade, in a sample of mostly Black children living in an underserved urban area of the Southeast

TABLE 3 Results from separate multi-level models predicting teacher-rated SEL outcomes with SEL building blocks (*N*=313).

	Fall K teacher-rated SEL (std.)		Spring K teacher-rated SEL (std.)		Fall first teacher-rated SEL (std.)		Spring first teacher-rated SEL (std.)	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
Behavioral self-regulation (k.entry) (std.)	0.11	0.06	0.16*	0.05	0.25*	0.08	0.26*	0.08
Choice delay (k.entry) (std.)	−0.12⁺	0.05	−0.05	0.05	−0.03	0.07	−0.02	0.05
Theory of mind (k.entry) (std.)	0.16*	0.06	0.09	0.05	0.04	0.07	0.15	0.08
Emotion sit. Know. (k. entry) (std.)	0.12	0.06	0.15*	0.06	0.21*	0.07	0.22*	0.06

Table summarizes results from 16 model specifications (each time point as the outcome, columns, with SEL building blocks input individually, rows). Standard errors are clustered at the classroom level. Covariates included in each model were child age, treatment status, female, attended pre-K, mother had HS degree, financial strain, expressive language, and working memory. Models predicting teacher-rated SEL beyond the fall K time point also include fall K teacher-rated SEL as a covariate. Coef., coefficient; std., standardized variable.
*denotes coefficients that are statistically significant at the 5% level after adjusting for multiple comparisons across models with the same SEL building block predictor.
⁺denotes coefficients that were initially statistically significant at the 5% level but are no longer significant after multiple comparison adjustments.

U.S. We highlight two findings of note: First, on their own, multiple building block SEL measures, plus controls, explained how teachers rated children's overall SEL as kindergarten and first graders. Second, when included in a single model, a measure of behavioral self-regulation, the Head-Toes-Knees-Shoulders (HTKS) task, was the best (and only) predictor, and in first grade only. While previous studies have shown the importance of behavioral self-regulation generally (McClelland et al., 2006; Moffitt et al., 2011), and the HTKS specifically (McClelland et al., 2014) for achievement, this study aligns with others suggesting that behavioral self-regulation also underlies some children's SEL (McKown et al., 2009).

Separately, multiple SEL building blocks explained variance in teacher ratings

The pattern of results for separate building blocks at the fall of kindergarten showed first, that teachers perceived those children who entered kindergarten with strong behavioral self-regulation—that is, able to remember instructions and work with information, switch rules, *and* control their impulses—as having the strongest overall SEL. This finding is important because we controlled for working memory and expressive language, which are also associated with classroom functioning and affected when children are exposed to adverse experiences, including living in poverty. Our results show that for mostly Black children from impoverished backgrounds, applying multiple executive function processes to behavioral actions may be more critical for a successful school transition than knowing vocabulary words and the more constrained ability to keep track of and work with information.

Results also imply a particularly important role for early theory of mind apparent at formal school entry, and for early emotion and situational knowledge that is apparent only later. Prior research (Brock et al., 2019b) found that theory of mind is a robust predictor of SEL skills and transition difficulty among impoverished children. Specifically, they reported that theory of mind acts as a mediator that connects other school readiness indicators, including behavioral self-regulation, vocabulary, and emotion and situational knowledge; to children's overall kindergarten adjustment. These and our results point to the importance of how well children can understand the subtleties associated with the various social contexts of school. Early theory of mind being strongly coupled with stronger SEL ratings at the start of kindergarten contradicts a research summary with mostly advantaged children that suggested that theory of mind's contribution to social skills may be more protracted than we found in the present study (Hughes and Devine, 2015). In oppressed communities, where resources are scarce and heightened responsivity to changing environmental conditions is advantageous (Miller-Cotto et al., 2022), children who can quickly intuit the mental and emotional states of others may develop the most successful relationships early in the school transition.

Interestingly, emotion and situational knowledge at school entry explained variance only later—but not at the fall of kindergarten. We posit that as school progresses, settings pose different challenges, which may change how children's initial strengths are perceived by their different teachers. The first 2 years of formal schooling have been described as a type of critical period. First grade in particular increases academic demands on children and first grade teachers have heightened expectations for children compared to kindergarten teachers. Kindergarten teachers, especially when school begins, may expect wide individual differences in children's emotion knowledge and familiarity with the emotions implicated by different situations, which may translate into a lack of association between children's emotion and situational knowledge and their initial kindergarten teacher ratings of overall SEL. As children prepare to enter first

TABLE 4 Multi-level model results from a single analysis predicting teacher-rated overall SEL with all building block measures (*N*=313).

	Fall K teacher-rated SEL (std.)		Spring K teacher-rated SEL (std.)		Fall 1st teacher-rated SEL (std.)		Spring 1st teacher-rated SEL (std.)	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
Behavioral self-regulation (k.entry) (std.)	0.05	0.06	0.12⁺	0.06	0.22*	0.08	0.23*	0.09
Choice delay (k.entry) (std.)	−0.11⁺	0.05	−0.03	0.05	0.02	0.07	0.02	0.05
Theory of mind (k.entry) (std.)	0.14⁺	0.06	0.06	0.06	−0.02	0.08	0.10	0.08
Emotion sit. Know. (k.entry) (std.)	0.06	0.06	0.11	0.07	0.16⁺	0.08	0.15⁺	0.07
Covariates								
Teacher-rated SEL (Fall K) (std.)			0.56*	0.05	0.20*	0.06	0.31*	0.06
Child age (std.)	0.07	0.05	−0.01	0.05	−0.10	0.07	−0.05	0.06
Treatment status	0.02	0.04	0.01	0.04	0.05	0.06	0.04	0.05
Female (Female = 1)	0.12⁺	0.05	0.11*	0.04	0.14⁺	0.06	0.15*	0.05
Pre-K attendance (Yes = 1)	0.02	0.05	−0.05	0.05	−0.08	0.07	−0.11	0.06
Caregiver's education (HS or more = 1)	0.04	0.05	−0.07	0.05	0.00	0.07	−0.06	0.07
Financial strain (std.)	−0.10⁺	0.05	−0.04	0.05	0.03	0.06	−0.05	0.06
Expressive vocabulary (std.)	0.04	0.07	−0.03	0.06	0.02	0.08	−0.10	0.08
Working memory (std.)	0.11	0.06	−0.00	0.06	0.04	0.08	0.04	0.08

Table presents results from four model specifications (each time point as the outcome, columns, with SEL building blocks input simultaneously). Standard errors are clustered at the classroom level. Coef., coefficient; std., standardized variable.

*denotes coefficients that are statistically significant at the 5% level after adjusting for multiple comparisons across models with the same SEL building block predictor.

⁺denotes coefficients that were originally statistically significant at the 5% level but were no longer significant after multiple comparison adjustments.

grade however, and as demands and teacher expectations increase, individual differences in kindergarten-entry emotion and situational knowledge may turn out to be important to overall SEL. Children who entered school able to infer emotional states, identify emotions, and understand how situations produce different emotions in different people may have had more success and friendships as time went on, which could in turn be perceived by teachers as better overall SEL.

Children with early strengths in behavioral self-regulation were perceived with better overall SEL in first grade

For perhaps similar reasons, early behavioral self-regulation was also the best, and only, predictor of first grade teacher ratings of overall SEL in the most robust models. Behavioral self-regulation is implicated in multiple domains of SEL, including self-management and responsible decision-making. Behavioral self-regulation is more complex than self-control or working memory as isolated skills, and requires children to remember information and switch their attention and responses, along with inhibiting a strong inclination (Schmidt et al., 2022). These processes indicate attentional skills and the ability to keep track of information and *then apply it* to one's behavior. We note that the HTKS is the only measure that required children's gross motor responses, as opposed to verbal or pointing responses. Regulating large body movements may be important to teachers, and Black children who have this skill may be perceived as better conforming to classroom expectations (Miller-Cotto et al., 2022).

In a previous study of mostly economically advantaged kindergarteners, children's scores on the HTKS were positively associated with teacher reports of children's classroom self-regulatory behaviors, but not their interpersonal skills (Cameron Ponitz et al., 2009). In contrast, our study's findings align with study of Montroy et al. (2014), where preschoolers with stronger behavioral self-regulation were rated with better social skills—which include not only interpersonal skills but also decision-making and self-control. It is possible that children with strong behavioral self-regulation are better able to manage the numerous and often changing demands of the early elementary classroom context because they can keep track of teacher instructions and then make decisions to align with those instructions, rather than their impulses. The strong predictive power of kindergarten-entry behavioral self-regulation for first grade teacher perceptions of children's overall SEL illuminates the intertwined nature of emotion regulation, attention, and behavior over the school transition in this underserved sample.

Limitations and future directions

This study includes several limitations. First, while a notable strength of this study was to examine which building blocks at kindergarten entry predicted teachers' ratings of overall SEL, we could not examine how the SEL building blocks themselves were developing over time. Because this co-development may be useful for understanding how building blocks contribute to overall SEL at different time points, future research should consider how the development of the building blocks might affect the development of overall SEL. Second, the design of this study was correlational; therefore, causal conclusions cannot be inferred. While we employed a rich set of covariates to account for many potential correlates of both children's direct assessments and teachers' ratings of overall SEL, we cannot fully account for potential other factors. Third, this sample reveals the associations among building blocks and overall SEL during the formal school transition among Black children from historically marginalized communities, but associations may not necessarily translate to other underserved communities with different socio-cultural contexts. In addition, while teacher ratings are a robust indicator of children's future functioning in school, more comprehensive assessment of children's SEL, such as with naturalistic observations or direct assessment of SEL domains, could shed light on the portion of ratings due to teacher factors as opposed to child factors. For example, we did not assess the extent to which teacher-child racial match might have explained teacher perceptions of children's overall SEL. Additionally, directly assessing one or more of the five SEL domains could illuminate which building blocks are important for which domain; our DESSA measure which shows a one-factor solution (Doromal et al., 2019) unfortunately does not allow us to disentangle this issue. The study is strengthened by looking at two school years, incorporating information from both kindergarten and first grade teachers, and points to several future directions as well.

Implications for research and practice

This study suggests several implications for research and practice. What school systems choose to assess informs what teachers choose to emphasize during classroom time. Strengths-based approaches, including direct assessment, can illuminate SEL building blocks in which to invest resources for kindergarten entry screening and classroom support (Frankenhuis and Nettle, 2020). Surveys are commonly used to assess children's social and behavioral skills, but may be biased by the reporter's prior knowledge of the child or community, or not provide actionable information when it is needed. Crucially, behavioral self-regulation and executive function are malleable (Diamond and Lee, 2011), and the HTKS measure specifically is sensitive to intervention, including among underserved groups (Schmitt et al., 2015). Still, few direct measures of this SEL building block exist that are accessible for school systems. This study suggests that adding behavioral self-regulation to school readiness batteries may be a good investment. Meanwhile, other SEL building blocks were associated with teacher-rated SEL skill at different time points, so the complexity and nuance of SEL should also be communicated to teachers and schools – similar to how language and literacy skills are conceptualized and supported in a highly detailed and sub-skill-specific way (National Institute of Child Health & Human Development and National Reading Panel, 2000; Denham et al., 2010). By understanding these associations for a sample of children underserved communities, we were able to identify the unique strengths and needs of these children, rather than focusing on population averages or making normative comparisons to children living in other community contexts. In turn, our findings inform interventions and investments that are most likely to benefit these communities specifically.

In addition, more attention is needed around developing measures that limit cultural bias and are appropriate for the population of interest. Such measures should be able to capture the full variability among individual children, without floor effects, to help identify strength and growth areas. Tablet-based assessment systems are one example that can be designed to address these issues and relieve teacher assessment burdens, assess skills directly, and are able to incorporate many readiness skills, including self-regulation and emotion knowledge (Tripathy et al., 2020). Assessment interpretations provided to teachers should emphasize that children develop skills along a continuum and that all children have room to improve in a given skill area, which can address teacher misconceptions or bias about children's innate or fixed capacities.

Conclusion

The COVID-19 pandemic and the international Black Lives Matter movement have illuminated the many social disparities the Black, Indigenous, and People of Color (BIPOC) individuals endure. These globally relevant issues have also created more urgency in schools, teachers, and families being able to attend to learning processes other than academic achievement. Ongoing discussion of pandemic-related learning loss must occur within a conversation of how to holistically support children as they enter school contexts, which affect them unequally depending on their socio-demographic characteristics. Social–emotional learning (SEL) skill is foundational to well-being, for all individuals and all social groups including in classrooms serving young children of color. School readiness batteries can support children by considering the complexity of SEL and the multiple building blocks that are associated with how teachers perceive their SEL. In a historically oppressed community, this study highlights the unique importance of children's early behavioral self-regulation

for how their teachers perceive them, socially, throughout first grade.

Data availability statement

The data analyzed in this study is subject to the following licenses/restrictions: data are not available for public use. Requests to access these datasets should be directed to JD, justin_doromal@brown.edu.

Ethics statement

The studies involving human participants were reviewed and approved by University of Virginia and the IRB at an institution in the community where the data were collected.

Author contributions

CC conceptualized the manuscript, conducted the literature review, and drafted the introduction, method, and discussion, and performed correlation analysis. HK conceptualized the manuscript, provided substantive writing in the introduction and literature review and discussion, and provided substantive edits to the entire manuscript. JD designed and conducted the main analyses, wrote the results section and created tables, helped to write and refine the method, and provided substantive edits to the entire manuscript. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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References

Bailey, R., and Jones, S. M. (2019). An integrated model of regulation for applied settings. *Clin. Child. Fam. Psychol. Rev.* 22, 2–23. doi: 10.1007/s10567-019-00288-y

Beaudoin, C., Leblanc, É., Gagner, C., and Beauchamp, M. H. (2020). Systematic review and inventory of theory of mind measures for young children. *Front. Psychol.* 10:2905. doi: 10.3389/fpsyg.2019.02905

Blad, E. (2016). Social-emotional learning: states collaborate to craft standards, policies. Education Week [Online]. Available at: https://www.edweek.org/leadership/social-emotional-learning-states-collaborate-to-craft-standards-policies/2016/08

Blair, C., and Ku, S. (2022). A hierarchical integrated model of self-regulation. *Front. Psychol.* 13:725828. doi: 10.3389/fpsyg.2022.725828

Blair, C., and Raver, C. C. (2012). Child development in the context of adversity: experiential canalization of brain and behavior. *Am. Psychol.* 67, 309–318. doi: 10.1037/a0027493

Blair, C., and Raver, C. C. (2015). School readiness and self-regulation: A developmental psychobiological approach. *Annu. Rev. Psychol.* 66, 711–731. doi: 10.1146/annurev-psych-010814-015221

Blair, C., and Razza, R. P. (2007). Relating effortful control, executive function, and false belief understanding to emerging math and literacy ability in kindergarten. *Child Dev.* 78, 647–663. doi: 10.1111/j.1467-8624.2007.01019.x

Brock, L. L., Kim, H., Gutshall, C. C., and Grissmer, D. W. (2019a). The development of theory of mind: predictors and moderators of improvement in kindergarten. *Early Child Dev. Care* 189, 1914–1924. doi: 10.1080/03004430.2017.1423481

Brock, L. L., Kim, H., Kelly, C. L., Mashburn, A. J., and Grissmer, D. W. (2019b). Theory of mind, directly and indirectly, facilitates kindergarten adjustment via verbal ability, executive function, and emotion knowledge. *Psychol. Sch.* 56, 176–193. doi: 10.1002/pits.22216

Brock, L. L., Murrah, W. M., Cottone, E. A., Mashburn, A. J., and Grissmer, D. W. (2018). An after-school intervention targeting executive function and visuospatial skills also improves classroom behavior. *Int. J. Behav. Dev.* 42, 474–484. doi: 10.1177/0165025417738057

Calkins, S. D. (2007). "The emergence of self-regulation: biological and behavioral control mechanisms supporting toddler competencies" in *Socioemotional Development in the Toddler Years: Transitions and Transformations*. eds. C. A. Brownell and C. B. Kopp (New York: Guilford), 261–284.

Cameron, C. E., Kim, H., Duncan, R. J., Becker, D. R., and McClelland, M. M. (2019). Bidirectional and co-developing associations of cognitive, mathematics, and literacy skills during kindergarten. *J. Appl. Dev. Psychol.* 62, 135–144. doi: 10.1016/j.appdev.2019.02.004

Cameron Ponitz, C. E., McClelland, M. M., Matthews, J. S., and Morrison, F. J. (2009). A structured observation of behavioral self-regulation and its contribution to kindergarten outcomes. *Dev. Psychol.* 45, 605–619. doi: 10.1037/a0015365

Caputi, M., Lecce, S., Pagnin, A., and Banerjee, R. (2012). Longitudinal effects of theory of mind on later peer relations: the role of prosocial behavior. *Dev. Psychol.* 48, 257–270. doi: 10.1037/a0025402

Climie, E., and Henley, L. (2016). A renewed focus on strengths-based assessment in schools. *Br. J. Spec. Educ.* 43, 108–121. doi: 10.1111/1467-8578.12131

Darling-Hammond, L., Flook, L., Cook-Harvey, C., Barron, B., and Osher, D. (2020). Implications for educational practice of the science of learning and development. *Appl. Dev. Sci.* 24, 97–140. doi: 10.1080/10888691.2018.1537791

Denham, S. A. (2006). Social-emotional competence as support for school readiness: what is it and how do we assess it? *Early Educ. Dev.* 17, 57–89. doi: 10.1207/s15566935eed1701_4

Denham, S. A., Bassett, H. H., and Zinsser, K. (2012). Computerizing social-emotional assessment for school readiness: first steps toward an assessment battery for early childhood settings. *J. Appl. Res. Child.* 3.

Denham, S. A., Blair, K. A., DeMulder, E., Levitas, J., Sawyer, K., Auerbach-Major, S., et al. (2003). Preschool emotional competence: pathway to social competence. *Child Dev.* 74, 238–256. doi: 10.1111/1467-8624.00533

Denham, S.A., Ji, P., and Hamre, B. (2010). "Compendium of preschool through elementary school social-emotional learning and associated assessment measures." (ed.) Collaborative for academic, and emotional learning and social and emotional learning research group, (Chicago, IL: University of Illinois at Chicago). 1–48.

Diamond, A. (2016). "Why improving and assessing executive functions early in life is critical" in *Executive Function in Preschool-Age Children: Integrating Measurement, Neurodevelopment, and Translational Research*. eds. J. A. Griffin, P. McCardle and L. S. Freund (Washington, DC, USA: American Psychological Association), 11–43.

Diamond, A., and Lee, K. (2011). Interventions shown to aid executive function development in children 4 to 12 years old. *Science* 333, 959–964. doi: 10.1126/science.1204529

Doromal, J. B., Cottone, E. A., and Kim, H. (2019). Preliminary validation of the teacher-rated DESSA in a low-income, kindergarten sample. *J. Psychoeduc. Assess.* 37, 40–54. doi: 10.1177/0734282917731460

Duncan, G. J., Dowsett, C. J., Claessens, A., Magnuson, K., Huston, A. C., Klebanov, P., et al. (2007). School readiness and later achievement. *Dev. Psychol.* 43, 1428–1446. doi: 10.1037/0012-1649.43.6.1428

Duran, C. A. K., and Grissmer, D. W. (2020). Choosing immediate over delayed gratification correlates with better school-related outcomes in a sample of children of color from low-income families. *Dev. Psychol.* 56, 1107–1120. doi: 10.1037/dev0000920

Durlak, J.A., Domitrovich, C.E., Weissberg, R.P., and Gullotta, T.P. (2015). *Handbook of Social and Emotional Learning: Research and Practice*. New York, NY: Guilford Press

Durlak, J. A., Weissberg, R. P., Dymnicki, A. B., Taylor, R. D., and Schellinger, K. B. (2011). The impact of enhancing students' social and emotional learning: A meta-analysis of school-based universal interventions. *Child Dev.* 82, 405–432. doi: 10.1111/j.1467-8624.2010.01564.x

Elliott, C. (2007). Differential ability scales (2nd ed.). San Antonio, TX: Harcourt Assessment.

Fernández García, L., Merchán, A., Phillips-Silver, J., and Daza González, M. T. (2021). Neuropsychological development of cool and hot executive functions between 6 and 12 years of age: A systematic review. *Front. Psychol.* 12:687337. doi: 10.3389/fpsyg.2021.687337

Frankenhuis, W. E., and Nettle, D. (2020). The strengths of people in poverty. *Curr. Dir. Psychol. Sci.* 29, 16–21. doi: 10.1177/0963721419881154

Fukuda, K., Vogel, E., Mayr, U., and Awh, E. (2010). Quantity, not quality: the relationship between fluid intelligence and working memory capacity. *Psychon. Bull. Rev.* 17, 673–679. doi: 10.3758/17.5.673

Garon, N., Bryson, S. E., and Smith, I. M. (2008). Executive function in preschoolers: a review using an integrative framework. *Psychol. Bull.* 134, 31–60. doi: 10.1037/0033-2909.134.1.31

Ghosh, G. (2021). Time to go big: promoting an equitable economic recovery. The optimist [online]. Available at: https://www.gatesfoundation.org/ideas/articles/equitable-economic-recovery-strategy (Accessed June 16, 2021).

Göllner, L. M., Ballhausen, N., Kliegel, M., and Forstmeier, S. (2017). Delay of gratification, delay discounting and their associations with age, episodic future thinking, and future time perspective. *Front. Psychol.* 8:2304. doi: 10.3389/fpsyg.2017.02304

Gonzales, C. R., Bowles, R., Geldhof, G. J., Cameron, C. E., Tracy, A., and McClelland, M. M. (2021). The head-toes-knees-shoulders revised (HTKS-R): development and psychometric properties of a revision to reduce floor effects. *Early Child. Res. Q.* 56, 320–332. doi: 10.1016/j.ecresq.2021.03.008

Greenberg, M. T. (2017). ""Social and emotional learning as a public health approach to education." *The Future of Children*, 27, 13–32.

Harvey, M. (2014). "Strengths-based approach" in *The SAGE Encyclopedia of Action Research*. eds. D. Coghlan and M. Brydon-Miller (London: SAGE).

Housman, D. K. (2017). The importance of emotional competence and self-regulation from birth: a case for the evidence-based emotional cognitive social early learning approach. *Int. J. Child Care Educ. Pol.* 11:13. doi: 10.1186/s40723-017-0038-6

Hughes, C., and Devine, R. T. (2015). Individual differences in theory of mind from preschool to adolescence: achievements and directions. *Child Dev. Perspect.* 9, 149–153. doi: 10.1111/cdep.12124

Hughes, C., and Ensor, R. (2011). Individual differences in growth in executive function across the transition to school predict externalizing and internalizing behaviors and self-perceived academic success at 6 years of age. *J. Exp. Child Psychol.* 108, 663–676. doi: 10.1016/j.jecp.2010.06.005

IBM Corp (2021). "*IBM SPSS Statistics for Windows, Version 27.0*." Armonk, NY: IBM Corp.

Immordino-Yang, M. H., Darling-Hammond, L., and Krone, C. R. (2019). Nurturing nature: how brain development is inherently social and emotional, and what this means for education. *Educ. Psychol.* 54, 185–204. doi: 10.1080/00461520.2019.1633924

Imuta, K., Henry, J. D., Slaughter, V., Selcuk, B., and Ruffman, T. (2016). Theory of mind and prosocial behavior in childhood: a meta-analytic review. *Dev. Psychol.* 52, 1192–1205. doi: 10.1037/dev0000140

Izard, C. E., King, K. A., Trentacosta, C. J., Morgan, J. K., Laurenceau, J.-P., Krauthamer-Ewing, E. S., et al. (2008). Accelerating the development of emotion competence in head start children: effects on adaptive and maladaptive behavior. *Dev. Psychopathol.* 20, 369–397. doi: 10.1017/S0954579408000175

Jones, S.M., and Kahn, J. (2017). The evidence base for how we learn: Supporting students' social, emotional, and academic development. Consensus Statements of Evidence from the Council of Distinguished Scientists. Aspen Institute.

Kidd, C., Palmeri, H., and Aslin, R. N. (2013). Rational snacking: young children's decision-making on the marshmallow task is moderated by beliefs about environmental reliability. *Cognition* 126, 109–114. doi: 10.1016/j.cognition.2012.08.004

Korkman, M., Kirk, U., and Kemp, S. (2007). *NEPSY Second Edition (NEPSY II)*. San Antonio, TX: Pearson.

LeBuffe, P. A., Shapiro, V. B., and Robitaille, J. L. (2018). The Devereux student strengths assessment (DESSA) comprehensive system: screening, assessing, planning, and monitoring. *J. Appl. Dev. Psychol.* 55, 62–70. doi: 10.1016/j.appdev.2017.05.002

Lee, W. S. C., and Carlson, S. M. (2015). Knowing when to be rational: flexible economic decision making and executive function in preschool children. *Child Dev.* 86, 1434–1448. doi: 10.1111/cdev.12401

Mashburn, A. J., Hamre, B. K., Downer, J. T., and Pianta, R. C. (2006). Teacher and classroom characteristics associated with teachers' ratings of prekindergartners' relationships and behaviors. *J. Psychoeduc. Assess.* 24, 367–380. doi: 10.1177/0734282906290594

McCabe, L. A., Rebello-Britto, P., Hernandez, M., and Brooks-Gunn, J. (2004). "Games children play: observing young children's self-regulation across laboratory, home, and school settings" in *Handbook of Infant, Toddler, and Preschool Mental Health Assessment*. eds. R. DelCarmen-Wiggins and A. Carter (New York: Oxford University Press), 491–521.

McClelland, M. M., Acock, A. C., and Morrison, F. J. (2006). The impact of kindergarten learning-related skills on academic trajectories at the end of elementary school. *Early Child. Res. Q.* 21, 471–490. doi: 10.1016/j.ecresq.2006.09.003

McClelland, M. M., and Cameron, C. E. (2012). Self-regulation in early childhood: improving conceptual clarity and developing ecologically valid measures. *Child Dev. Perspect.* 6, 136–142. doi: 10.1111/j.1750-8606.2011.00191.x

McClelland, M. M., Cameron, C. E., Duncan, R., Bowles, R. P., Acock, A. C., Miao, A., et al. (2014). Predictors of early growth in academic achievement: the head-toes-knees-shoulders task. *Front. Psychol.* 5:599. doi: 10.3389/fpsyg.2014.00599

McClelland, M. M., Morrison, F. J., and Holmes, D. L. (2000). Children at risk for early academic problems: the role of learning-related social skills. *Early Child. Res. Q.* 15, 307–329. doi: 10.1016/S0885-2006(00)00069-7

McKown, C., Gumbiner, L. M., Russo, N. M., and Lipton, M. (2009). Social-emotional learning skill, self-regulation, and social competence in typically developing and clinic-referred children. *J. Clin. Child Adolesc. Psychol.* 38, 858–871. doi: 10.1080/15374410903258934

Miller, A. L., Gouley, K. K., Seifer, R., Zakriski, A., Eguia, M., and Vergnani, M. (2005). Emotion knowledge skills in low-income elementary school children: associations with social status and peer experiences. *Soc. Dev.* 14, 637–651. doi: 10.1111/j.1467-9507.2005.00321.x

Miller-Cotto, D., Smith, L. V., Wang, A. H., and Ribner, A. D. (2022). Changing the conversation: A culturally responsive perspective on executive functions, minoritized children and their families. *Infant Child Dev.* 31:e2286. doi: 10.1002/icd.2286

Miyake, A., Friedman, N. P., Emerson, M. J., Witzki, A. H., and Howerter, A. (2000). The unity and diversity of executive functions and their contributions to complex "frontal lobe" tasks: a latent variable analysis. *Cogn. Psychol.* 41, 49–100. doi: 10.1006/cogp.1999.0734

Moffitt, T. E., Arseneault, L., Belsky, D., Dickson, N., Hancox, R. J., Harrington, H., et al. (2011). A gradient of childhood self-control predicts health, wealth, and public safety. *Proc. Natl. Acad. Sci.* 108, 2693–2698. doi: 10.1073/pnas.1010076108

Montroy, J. J., Bowles, R. P., Skibbe, L. E., and Foster, T. D. (2014). Social skills and problem behaviors as mediators of the relationship between behavioral self-

regulation and academic achievement. *Early Child. Res. Q.* 29, 298–309. doi: 10.1016/j.ecresq.2014.03.002

Morgan, J. K., Izard, C. E., and King, K. A. (2009). Construct validity of the emotion matching task: preliminary evidence for convergent and criterion validity of a new emotion knowledge measure for young children. *Soc. Dev.* 19, 52–70. doi: 10.1111/j.1467-9507.2008.00529.x

National Institute of Child Health & Human Development and National Reading Panel (2000). Report of the National Reading Panel: Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction. U.S. Dept. of Health and Human Services, Public Health Service, National Institutes of Health, National Institute of Child Health and Human Development, Bethesda, MD, USA.

Olson, S. L., Lopez-Duran, N., Lunkenheimer, E. S., Chang, H., and Sameroff, A. J. (2011). Individual differences in the development of early peer aggression: integrating contributions of self-regulation, theory of mind, and parenting. *Dev. Psychopathol.* 23, 253–266. doi: 10.1017/s0954579410000775

Raver, C. C. (2002). Emotions matter: making the case of the role of young children's emotional development for early school readiness. *SRCD Soc. Pol. Rep.* 16, 1–20. doi: 10.1002/j.2379-3988.2002.tb00041.x

Raver, C. C. (2012). Low-income children's self-regulation in the classroom: scientific inquiry for social change. *Am. Psychol.* 67, 681–689. doi: 10.1037/a0030085

Razza, R. P., and Blair, C. (2003). False-belief understanding in a low-income population. *Early Educ. Dev.* 14, 425–440. doi: 10.1207/s15566935eed1404_3

Rimm-Kaufman, S. E., Curby, T. W., Grimm, K. J., Nathanson, L., and Brock, L. L. (2009). The contribution of children's self-regulation and classroom quality to children's adaptive behaviors in the kindergarten classroom. *Dev. Psychol.* 45, 958–972. doi: 10.1037/a0015861

Rosanbalm, K. (2021). "Social and emotional learning during COVID-19 and beyond: Why it matters and how to support it." Duke University, Sanford School of Public Policy.

Rudasill, K. M., and Konold, T. R. (2008). Contributions of children's temperament to teachers' judgments of social competence from kindergarten through second grade. *Early Educ. Dev.* 19, 643–666. doi: 10.1080/10409280802231096

Russell, B. S., Lee, J. O., Spieker, S., and Oxford, M. L. (2016). Parenting and preschool self-regulation as predictors of social emotional competence in 1st grade. *J. Res. Child. Educ.* 30, 153–169. doi: 10.1080/02568543.2016.1143414

Schmidt, H., Daseking, M., Gawrilow, C., Karbach, J., and Kerner Auch Koerner, J. (2022). Self-regulation in preschool: are executive function and effortful control overlapping constructs? *Dev. Sci.*:e13272. doi: 10.1111/desc.13272 [Epub ahead of print].

Schmitt, S. A., McClelland, M. M., Tominey, S. L., and Acock, A. C. (2015). Strengthening school readiness for head start children: evaluation of a self-regulation intervention. *Early Child. Res. Q.* 30, 20–31. doi: 10.1016/j.ecresq.2014.08.001

Schultz, D., and Izard, C.E. (1998). "*Assessment of Children's Emotion Skills (ACES)*". Newark, DE: University of Delaware.

Schultz, D., Izard, C. E., Ackerman, B. P., and Youngstrom, E. A. (2001). Emotion knowledge in economically disadvantaged children: self-regulatory antecedents and relations to social difficulties and withdrawal. *Dev. Psychopathol.* 13, 53–67. doi: 10.1017/S0954579401001043

Schultz, D., Izard, C. E., and Bear, G. (2004). Children's emotion processing: relations to emotionality and aggression. *Dev. Psychopathol.* 16, 371–387. doi: 10.1017/S0954579404044566

Shoda, Y., Mischel, W., and Peake, P. K. (1990). Predicting adolescent cognitive and self-regulatory competencies from preschool delay of gratification: identifying diagnostic conditions. *Dev. Psychol.* 26, 978–986. doi: 10.1037/0012-1649.26.6.978

Spilt, J. L., Hughes, J. N., Wu, J.-Y., and Kwok, O.-M. (2012). Dynamics of teacher-student relationships: stability and change across elementary school and the influence on children's academic success. *Child Dev.* 83, 1180–1195. doi: 10.1111/j.1467-8624.2012.01761.x

StataCorp (2019). "*Stata Statistical Software: Release 16*". College Station, TX, USA: StataCorp LP

The White House (2021). "*Fact Sheet: The American Families Plan*". Washington, DC, USA: Office of the Press Secretary.

Tripathy, R., Burke, R., and Kwan, T. (2020). "*Case study: Implementing Cognitive ToyBox Alongside a Traditional Observation-Only Approach to Assessment in the Early Childhood Classroom*." San Francisco, CA, USA: WestEd

Vinokur, A. D., Price, R. H., and Caplan, R. D. (1996). Hard times and hurtful partners: how financial strain affects depression and relationship satisfaction of unemployed persons and their spouses. *J. Pers. Soc. Psychol.* 71, 166–179. doi: 10.1037/0022-3514.71.1.166

von Hippel, P. T. (2007). Regression with missing Ys: an improved strategy for analyzing multiply imputed data. *Sociol. Methodol.* 37, 83–117. doi: 10.1111/j.1467-9531.2007.00180.x

Wang, Z. (2015). Theory of mind and children's understanding of teaching and learning during early childhood. *Cogent Educ.* 2:1011973. doi: 10.1080/2331186X.2015.1011973

Watts, T. W., Duncan, G. J., and Quan, H. (2018). Revisiting the marshmallow test: A conceptual replication investigating links between early delay of gratification and later outcomes. *Psychol. Sci.* 29, 1159–1177. doi: 10.1177/0956797618761661

Weissberg, R. P., Durlak, J. A., Domitrovich, C. E., and Gullotta, T. P. (2015). "Social and emotional learning: past, present, and future" in *Handbook of Social and Emotional Learning: Research and Practice*. eds. J. A. Durlak, C. E. Domitrovich, R. P. Weissberg and T. P. Gullotta (New York, NY, US: The Guilford Press), 3–19.

Wellman, H. M., and Liu, D. (2004). Scaling of theory-of-mind tasks. *Child Dev.* 75, 523–541. doi: 10.1111/j.1467-8624.2004.00691.x

Zelazo, P. D., and Carlson, S. M. (2012). Hot and cool executive function in childhood and adolescence: development and plasticity. *Child Dev. Perspect.* 6, 354–360. doi: 10.1111/j.1750-8606.2012.00246.x

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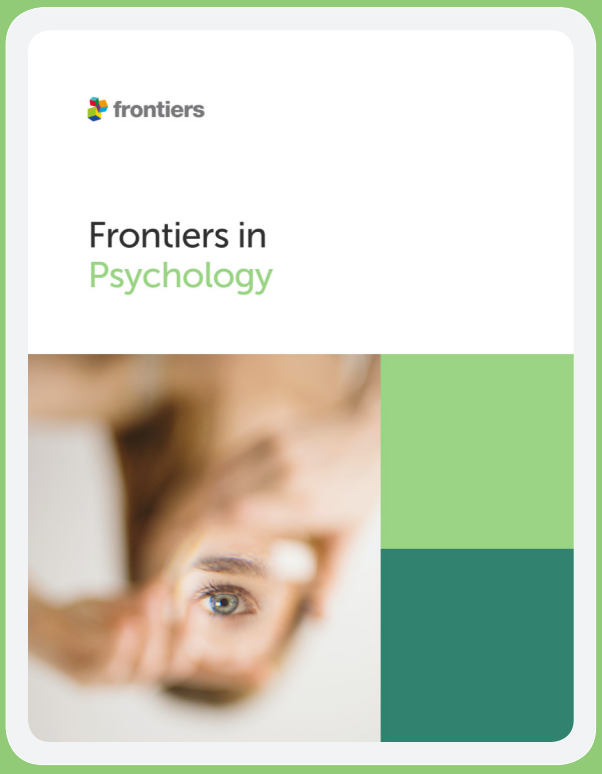

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